

INDIA RUBBER WORLD

TECHNOLOGY DEPARTMENT

OUR
60th YEAR



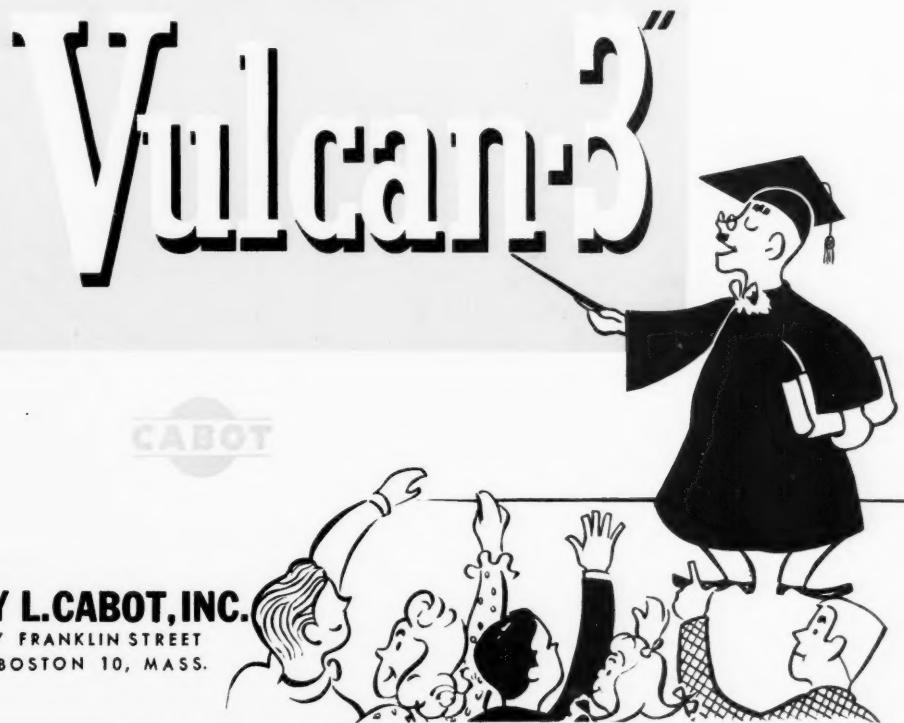
SEPTEMBER, 1949

COLD FACTS ABOUT "COLD" RUBBER

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Everybody knows—

"IT'S BETTER WITH



GODFREY L. CABOT, INC.

77 FRANKLIN STREET
BOSTON 10, MASS.

To stiffen uncured GR-I stocks

use DU PONT

POLYAC

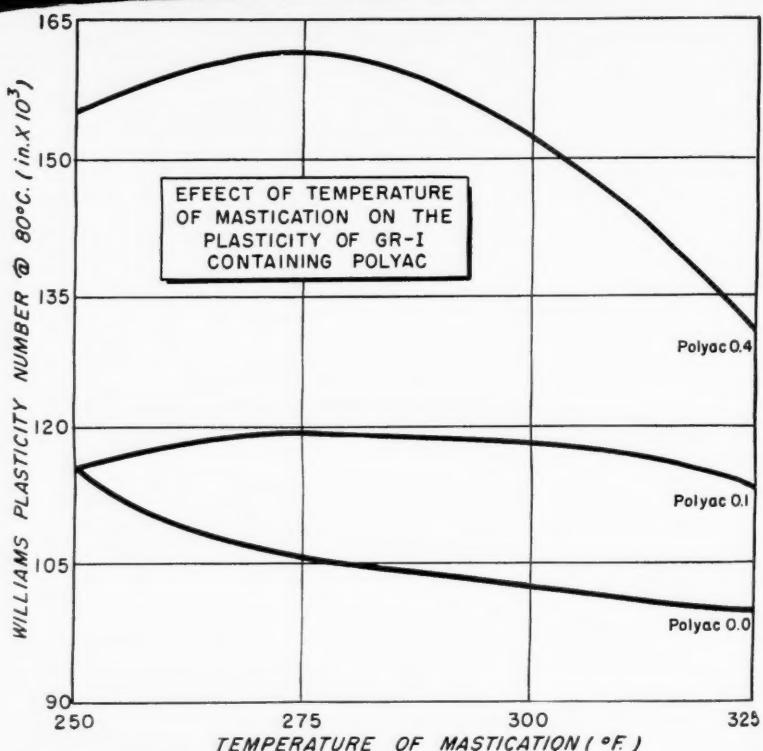
The use of Polyac can help you reduce creasing and splice defects in GR-I inner tube stocks—minimize cold flow of uncured mold preparations. Useful either to offset heat-softening of GR-I or to actually increase stock stiffness, Polyac is readily adaptable to your plant requirements.

As shown in the graph, a small amount of Polyac reduces the sensitivity of GR-I to variable processing temperatures. Even over the temperature range of 250° to 325° F., essentially constant plasticity was maintained through the use of only 0.1 part of Polyac. And, with larger amounts, the stiffness of the uncured stock can be substantially increased. For example, the data in the graph show that mastication at 275° F., GR-I containing 0.4 part of Polyac had a Williams plasticity number of 161 compared with a plasticity number of 106 for the control stock containing no Polyac.

In using Polyac as a stiffening agent, you collect a dividend, since it is also an effective accelerator-activator in GR-I stocks. Its use results in higher modulus and tear strength—lower permanent set.

Additional data on the use of Polyac as a stiffening agent in GR-I can be found in Report BL-232. Extra copies are available.

Tune in to Du Pont "Cavalcade of America,"
Tuesday Nights—NBC Coast to Coast



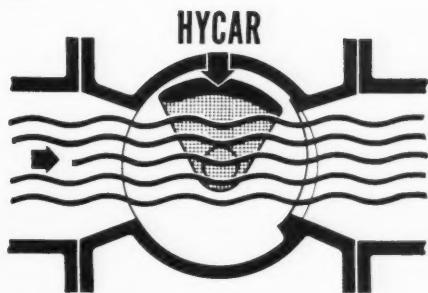
DU PONT RUBBER CHEMICALS
E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.



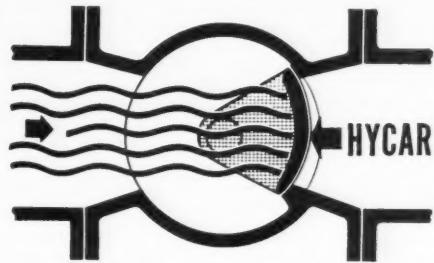
BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY



DeZurik Easy Operating Plug Valve, DeZurik
Shower Co., Sartell, Minn.



Valve Open. The eccentric lifts the plug face from all contact with the seat. Line pressures cannot distort or stretch the metal-cored rubber sealing member. Merely a quarter-turn of the lever establishes full-open flow.



Valve Closed. The resilient, Hycar face of the plug makes drip-tight contact with the seat in the body. Perfect closure is insured even when flow includes rust, scale, sand, abrasives or foreign matter.

Flow control valve with a leak-proof "heart"

THE valve you see here insures a drip-tight shut-off for gases or liquids, vitally important in many processes. It is absolutely leak-proof even when the flow includes rust, scale, abrasives or foreign matter.

Here's the "secret." An exclusive eccentric principle releases the face of the valve from all contact with the seat, except when the valve is closed. The "heart" of the valve—the plug—is faced with Hycar providing the leak-proof closure, the valve's big feature.

Hycar was chosen because of its resilience and its resistance to

the widest range of chemical and petroleum products. Hycar can be bonded to the metal, which is necessary in molding to the core. Equally important, Hycar resists dimensional changes and has minimum cold flow under load.

Perhaps Hycar can solve a problem for you, or improve a product. Hycar is oil-and-gas-resistant,

light in weight. It resists heat, cold and aging. It has high tensile strength, good resilience and extreme resistance to abrasion. Compounds can be varied from extremely soft to bone hard, and made in many colors.

Versatile Hycar is used as a rubber base material . . . as a plasticizer for vinyl resins . . . as a modifier for phenolics . . . as an adhesive base . . . as a latex for coating or impregnating. Find out how it may help you, profitably. Please write Dept. HA-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
Reg. U. S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

A DIVISION OF
THE B. F. GOODRICH COMPANY



Philomath—*A lover of mathematical figures!*

Philblack* O—*The HAF black that figures so successfully in "cold" rubber.*

Problem: Find the carbon black that is the most effective reinforcement for low temperature rubber.

Solution: Philblack O plus "cold" rubber produces the highest quality tire treads ever offered to the public.

Corollary: Philblack O also brings out excellent tread qualities in GR-S and natural rubber.

Q. E. D.

PHILLIPS CHEMICAL COMPANY

PHILBLACK SALES DIVISION

EVANS BUILDING • AKRON 8, OHIO



Warehouses in Akron, Boston, Chicago and Trenton. West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.



*A Trade-mark

INDIA RUBBER WORLD

for
butyl
rubber
vulcanization

NAUGATUCK

G-M-F and DIBENZO G-M-F

G-M-F produces high modulus in butyl compounds with an oxidizing agent such as red lead, or with M-B-T-S—in the manufacture of tire curing bags—gaskets—wire insulations. Very active—with low critical curing temperatures.

DIBENZO G-M-F is a retarded form of G-M-F, with more delayed action and processing safety.

PROCESS

ACCELERATE

PROTECT

WITH

NAUGATUCK CHEMICALS

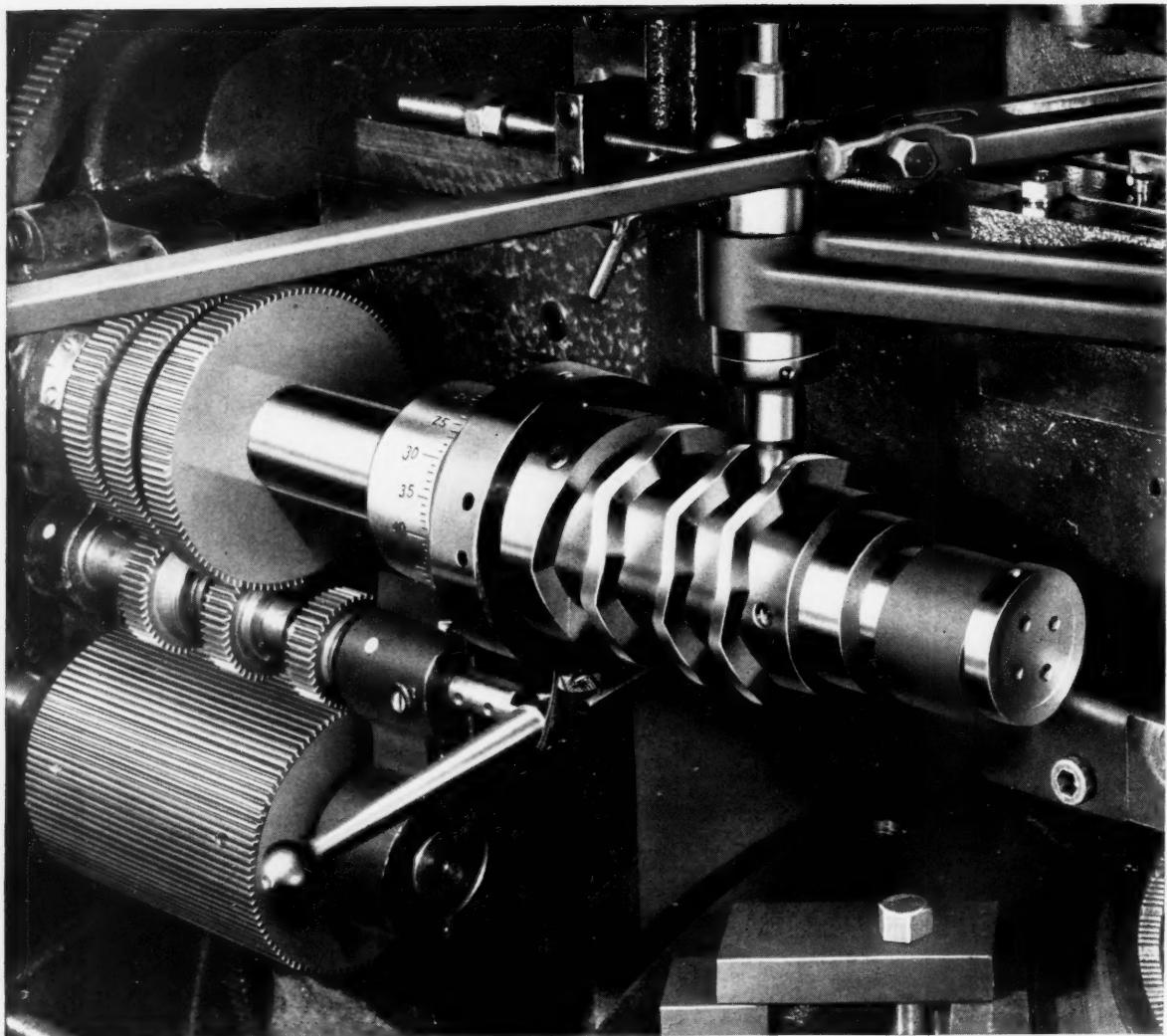
Naugatuck



Chemical

Division of United States Rubber Company

NAUGATUCK • CONNECTICUT



WHY VARIABLE PITCH MOLDS NO LONGER COST A PREMIUM

UNTIL the development by BRIDGWATER of the transmission shown above, engraved tire molds of the variable pitch type were substantially more expensive than molds of a uniform pitch.

This ingenious unit is a special attachment we use on our BRIDGWATER MOLD ENGRAVING MACHINES*. By shifting the gear lever to

any one of three different positions, a long, short or medium pitch may be cut with unfailing accuracy and at a cost essentially no greater than cutting a uniform pitch . . . just another example of our determination to make molds of whatever characteristics the tire industry requires . . . at the lowest possible cost.

* Designed and built by Bridgwater and used by leading mold makers the world over.

THE BRIDGWATER MACHINE COMPANY
Akron, Ohio

FOR BETTER MOLDS FOR BETTER TIRES SPECIFY BRIDGWATER

In
pro

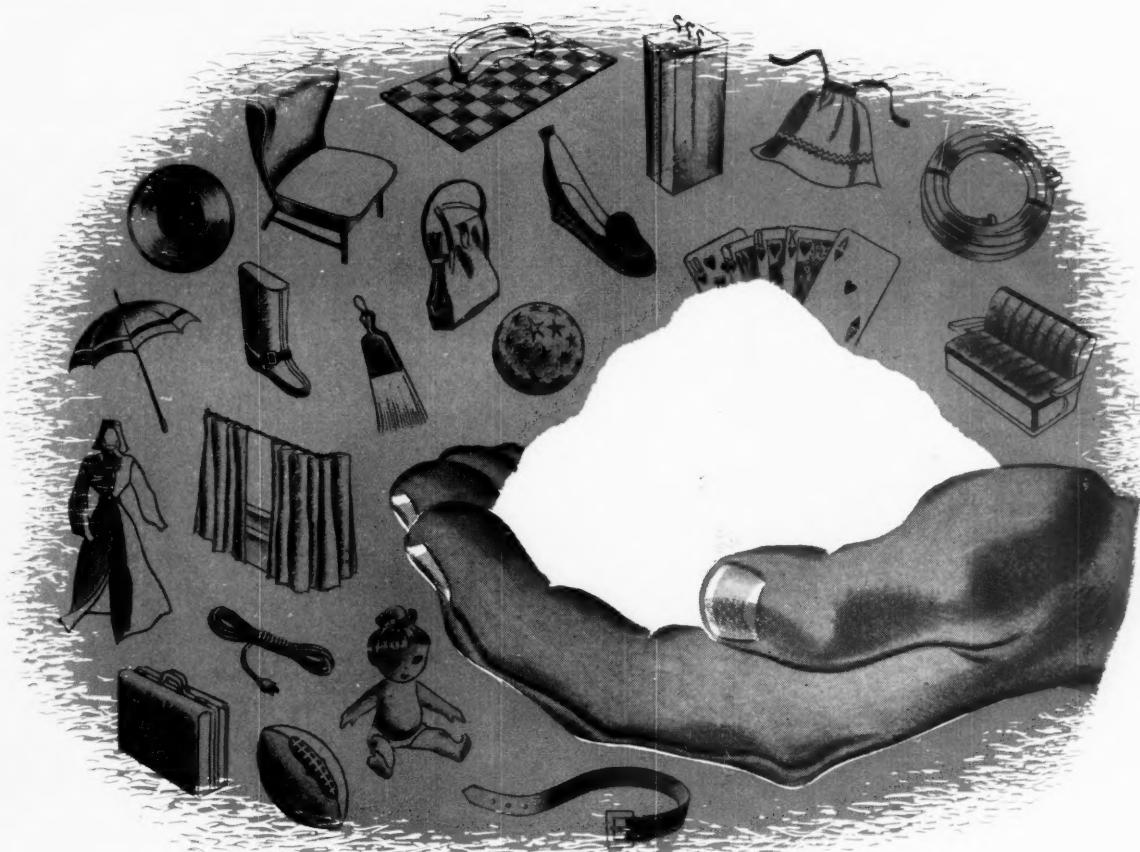
I
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Sept



Tests show *Marvinol*® saves time... improves quality in making plastics

In laboratory tests and production runs, Marvinol vinyl resins are proved time-savers due to shorter pre-mix, open mill and Banbury cycles . . . faster extrusion cycles.

IN ADDITION TO TIME-SAVINGS in processing, Marvinol offers many important benefits to processors, fabricators, marketers and consumers. Products based on Marvinol vinyl resins have greater flexibility at low temperatures . . . less deformation due to heat. They're extra tough, dry and pleasant to touch. They resist oils, acids, wear, tear and abrasion.

Marvinol's extra toughness and dryness make plastics products more durable with a surface that's pleasant to touch.

Marvinol's greater flexibility in low temperatures pays off in products subjected to severe exposure and cold weather during shipping or use.

Superior dimensional stability makes Marvinol vinyl resin an ideal raw material for products that must not shrink or deform under heat and time.

High processability spreads these benefits to many varied fields, for Marvinol can be calendered, extruded, injection-molded or dispersed for coating and slush molding . . . in rigid, semi-rigid or elastomeric formulations . . . Test this remarkable vinyl polymer. Chances are, if you're a processor, it will pay you in time-savings and quality . . . and if you make

end products it will increase the salability of your merchandise.

The entire efforts of our modern development laboratories are for our customers' benefit. All the formulation, compounding and processing information developed here is at your disposal since it is only through you that Marvinol-based products reach the consumer market. Write to Chemicals Division, Dept. I-9, THE GLENN L. MARTIN COMPANY, BALTIMORE 3, MARYLAND.

Martin®

RESINS, PLASTICIZERS AND
STABILIZERS PRODUCED BY
THE CHEMICALS DIVISION OF

THE GLENN L. MARTIN COMPANY • AN INTERNATIONAL INSTITUTION
"BETTER PRODUCTS, GREATER PROGRESS, ARE MADE BY MARTIN"

MANUFACTURERS OF: Dependable Martin 2-0-2 airliners • Advanced military aircraft • Revolutionary rockets and missiles • Electronic fire control systems

• Versatile Marvinol resins (Martin Chemicals Division) •

DEVELOPERS OF: Mareng fuel tanks (licensed to U. S. Rubber Co.) • Stratovision aerial rebroadcasting

Marvinol

(in conjunction with Westinghouse Electric Corp.) • Honeycomb construction material (licensed to U. S. Plywood Corp.) • New type hydraulic automotive and aircraft brake • Permanent fabric flameproofing • **LEADERS IN RESEARCH** to guard the peace, build better living in far-reaching fields.

NATIONAL-
STANDARD

*braided wire
braid*

**makes steam hose
tougher**

simplifies production

HERE'S a suggestion that might help you improve the strength and life of your hose, while reducing production costs! Simply weigh carefully *all* the advantages you stand to gain by using National-Standard flat braided wire braid in your hose construction.

For example, flat braided wire braid eliminates the problem of single wire breaks and uneven loops. You save the time and material normally lost in attempting to equalize wire length and tension for uniform stress distribution. Production is greatly simplified. Quality can be better controlled . . . with fewer seconds and rejects. Moreover, unequaled mechanical adhesion prolongs hose life and eliminates a frequent cause of failure.

Why not talk it over with a National-Standard engineer? As usual, National-Standard is ready to give you all the help you want . . . all the benefit of over 40 years of intimate experience with wire-in-rubber problems.



DIVISIONS OF NATIONAL-STANDARD CO.

ATHENIA STEEL . . . Clifton, N. J.	Flat, High Carbon, Cold Rolled Spring Steel
NATIONAL-STANDARD . . . Niles, Mich.	Tire Wire, Fabricated Braids and Tape
WAGNER LITHO MACHINERY . . . Jersey City, N. J.	Lithographing and Special Machinery
WORCESTER WIRE WORKS . . . Worcester, Mass.	Round Steel Wire, Small Sizes



MARBON "8000"

... a NEW high-styrene reinforcing resin
furnished in "Easy Processing" form

MARBON "8000" is a versatile high-styrene resin extremely compatible with all the various rubbers and has filled a need where high reinforcement is necessary, and, in general, in stocks requiring the following properties: good dielectric values; low specific gravity; improved tear and flex-crack resistance; high hardness and stiffness; light color; and improved mixing, processing, and mold flow.

"**MARBON 8000**" can be mixed in one stage operation as it does not require masterbatching.

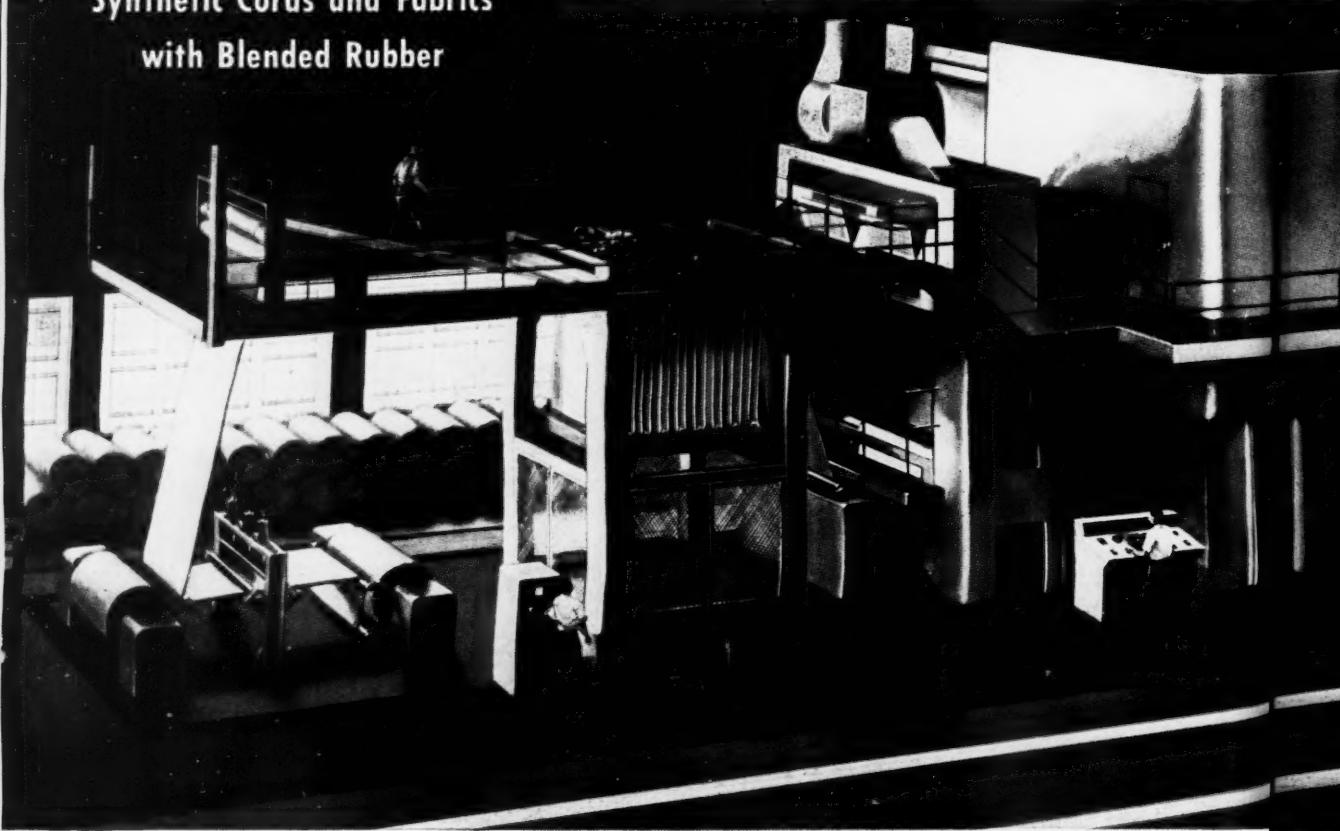
A FEW OF THE END USES IN WHICH MARBON "8000" HAS FOUND A USEFUL PLACE

Bicycle seats
Footwear
Garden hose
Rubber bumpers
Steering wheels
Table and desk tops
Conveyor belts
Bibb washers
Football helmets
Garter buttons
Cutting blocks
Deep-freeze gaskets
Ski pole rings
Breaker strips
Casters
Appliance plugs
Soling
Floor tile

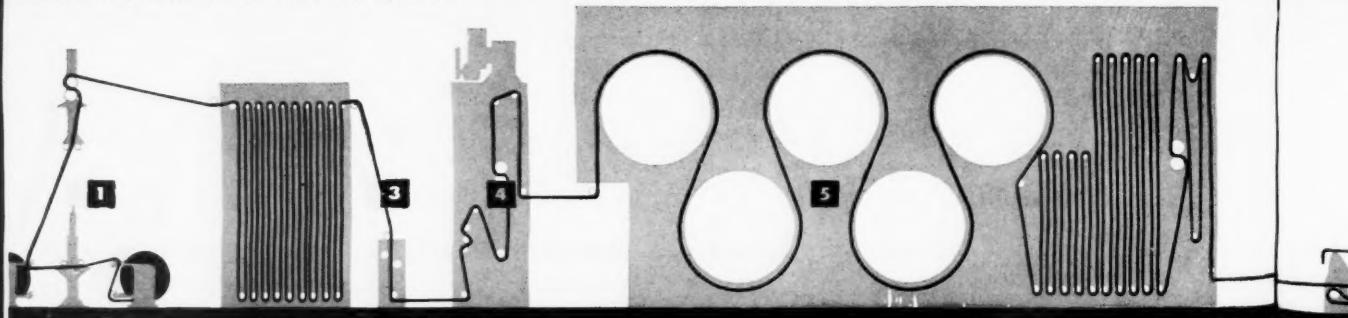
MARBON CORPORATION
GARY, INDIANA

Continuous and electronically

For the treatment of
all types of Natural and
Synthetic Cords and Fabrics
with Blended Rubber



COURTESY DAYTON RUBBER MANUFACTURING COMPANY



This all electronically controlled tandem operation, the first ever to be assembled, treats all types of natural and synthetic cord fabrics with blended rubber in one continuous, high speed operation, eliminating the frequent re-handling of material in the many separate and slower operations formerly required. The unit adjusts to predetermined standards, by finger-tip control, the strength and elongation of

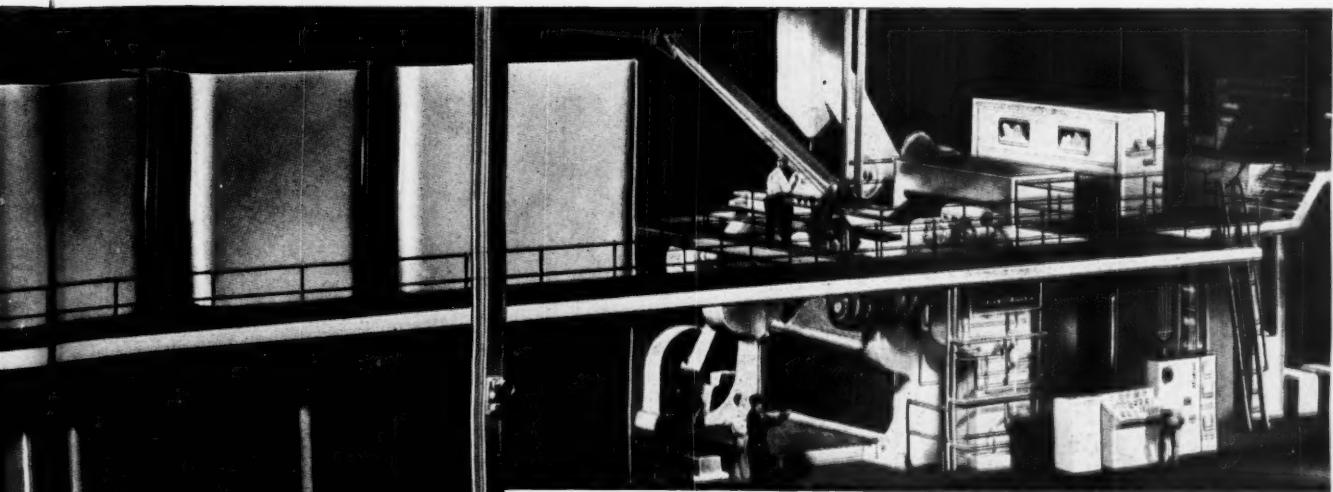
the fabric, surrounding and impregnating each cord with blends of rubber. It dips, stretches, impregnates and coats at speeds up to 180 feet per minute. By synchronized electronic methods the highest quality of treated cords and fabrics is maintained to an exact degree of uniformity, with constant tension maintained at all points throughout the process.

controlled multi-processing train

Recently designed, built and installed

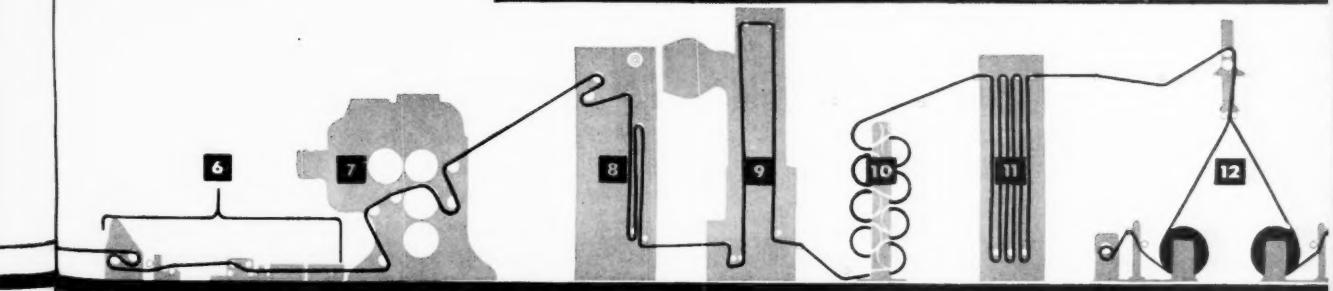
by Adamson United Company

for a prominent Tire Manufacturer



OPERATION OF CONTINUOUS AND ELECTRONICALLY CONTROLLED MULTI-PROCESSING TRAIN

1. ELECTRONICALLY REGULATED DRIVES feed the fabric from 1,100 lbs., 750 yd. rolls into the train at the proper tension and rate.
2. STORAGE FESTOONER in which is reserved 180 ft. of fabric permitting operation of train while ends of rolls are being spliced together.
3. SUCTION CLEANER removes any small particles of lint or dirt.
4. DIP TOWER where fabric is continuously treated with liquid latex composition.
5. DRYING OVEN where fabric is blasted with high velocity 300°F. heated air.
6. PRE-TENSION ROLLS control the fabric entering the Calender to prop-
erly center it and prevent it from narrowing.
7. FOUR ROLL CALENDER coats both sides of fabric to a smooth, predetermined thickness.
8. TENSION DEVICE AND COMPENSATOR holds fabric under proper tension as it leaves calender.
9. POST DIPPING is necessary when using certain types of rubber blends.
10. COOLING ROLLS which remove heat acquired in calendering operation.
11. AUTOMATIC STORAGE FESTOONER.
12. ELECTRONICALLY CONTROLLED WIND-UP MACHINES.



Designing processes and building machinery to meet special or unusual requirements is our business. The

experience and abilities of our engineering staff are available for your particular problems.



Adamson United Company

AKRON, OHIO

SALES OFFICES: 441 Lexington Ave., New York City • 140 S. Clark St., Chicago, Illinois • 5140 Crenshaw Blvd., Los Angeles, Calif. • 8 Avenue Percier, Paris 8^eme, France • Avenida Paseo Andaluz, Madrid, Spain

REGISTERED

SCOTT
TESTERS

TRADEMARK

Scott Testers 50th Anniversary

1899



Fifty years of cooperation in developing equipment to fulfill the indicated requirements of the industries we serve, have led to our growth from this small beginning to our present world-wide recognition as a source of quality testing apparatus. Industry has put its trust in us, and we look toward our second half-century with appreciation of your faith, and determination to merit it even more.

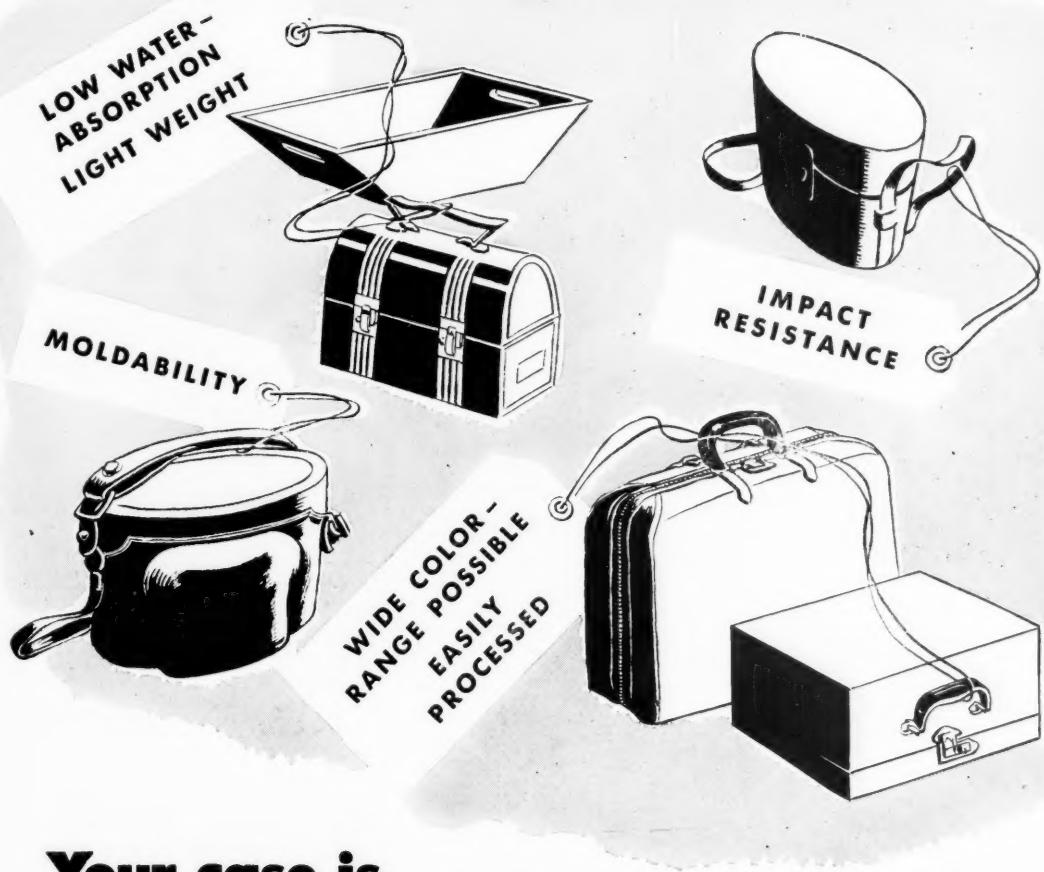
1949



PROVIDENCE, R. I.

To the Rubber Industry
a sincere "Thank You" for
50 years of Cooperation

Scott Testers Inc.



Your case is stronger with **Plio-Tuf**

AMONG the many potential uses of **Plio-Tuf**—Goodyear's new combination of resin and rubber—is the manufacture of a wide range of cases and luggage of various types, as well as football helmets, textile spools, chemical containers, etc.

Plio-Tuf—a combination of natural or synthetic rubber and **Pliolite** resins—can be varied in compounding to produce desired characteristics in the final material. It is hard and has high impact-resistance—

resists shattering. Characterized by low water-absorption, **Plio-Tuf** also has very good chemical resistance. In processing, **Plio-Tuf** has excellent moldability, and can be cut, sawed, machined, sewed on automatic sewing machines. Available in any color, **Plio-Tuf** can be buffed to a high gloss—is tougher, more durable and costs less than many of the materials which it replaces.

Plio-Tuf compounds are easily pre-

pared by conventional plastic and rubber procedures, using either the two-roll mill or the Banbury. Ask for full compounding details on **Plio-Tuf**—Goodyear's use-proved combination of **Pliolite** resins and rubber. Write to:

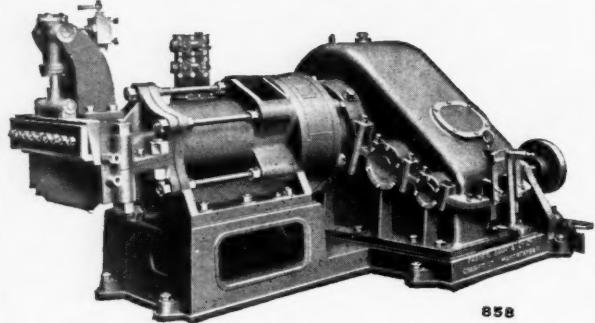
Goodyear, Chemical Division
Akron 16, Ohio.



GOOD YEAR

Plio-Tuf, Pliolite—T.M.'s The Goodyear Tire & Rubber Company

RUBBER EXTRUDERS



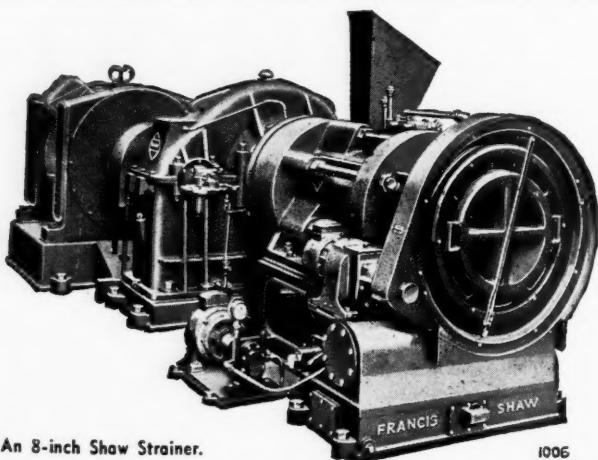
An 8-inch Shaw Extruder
for Tyre Tread Production

WE CAN EQUIP
COMPLETE TYRE
PLANTS AND GEN-
ERAL RUBBER PROC-
ESSING FACTORIES
WITH MACHINERY
PRODUCED ON
MODERN PLANT BY
SKILLED WORKMEN
AND TECHNICIANS.

*We have been
making all types
of extruders for
the rubber industry
since 1879*



Your enquiries will receive
the benefit of over 65 years
experience in the design
and manufacture of sound
machines.



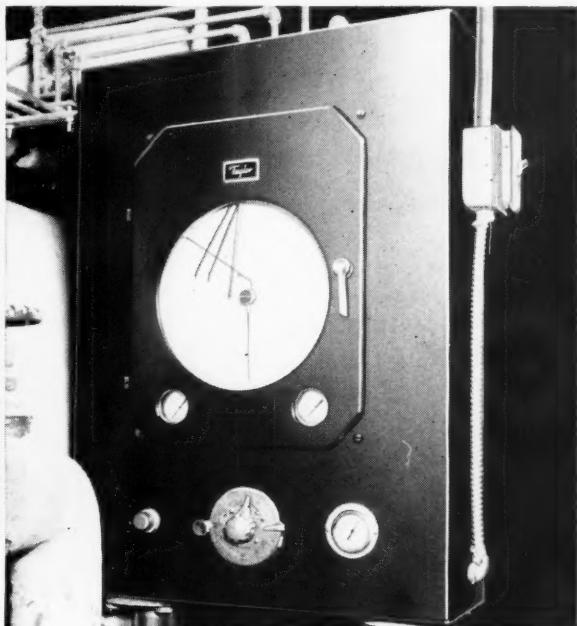
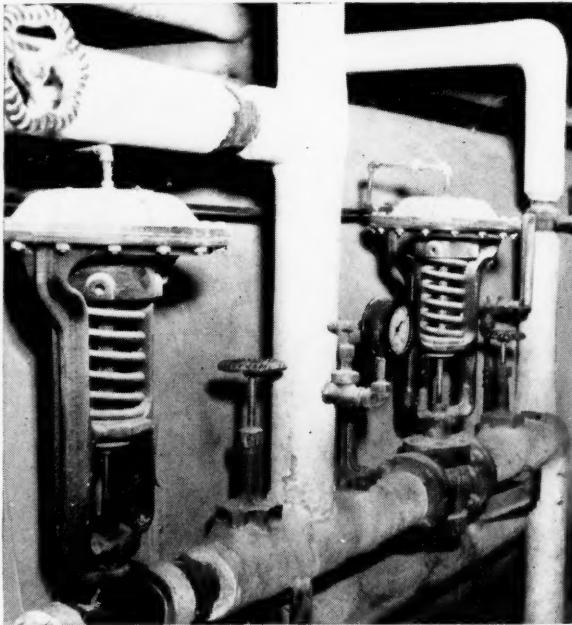
An 8-inch Shaw Strainer.

FRANCIS SHAW & CO. LTD. MANCHESTER 11 ENGLAND

R-138

SURE CURE

AT LOWEST COST



YES, this Taylor Vulcanizer Control System is delivering consistently uniform cures at lowest cost for the Goodyear Tire and Rubber Company, Akron, Ohio. It's a Taylor Packaged Unit with Double Duty Process Timer—running one of a battery of big mechanical goods vulcanizers. The operator simply loads the vulcanizer and sets the cure time. Then Taylor Control takes over with an automatically coordinated system of time and temperature . . . faithfully repeating each cycle again and again. Results for Goodyear—

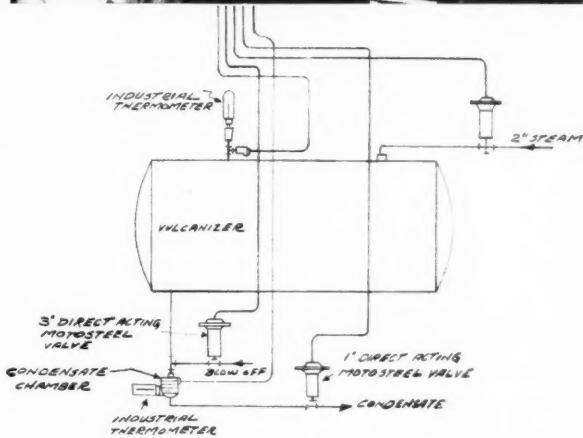
Increased production through increased efficiency . . . fewer rejects.

Greatly reduced costs through steam savings.

A big saving in manpower. Operators released for other duties—and from all responsibility for efficient processing.

We believe there's a moral in this Taylor Packaged Unit story for anyone who's interested in closely coordinated control of any important rubber process. It might be called *instrumental teamwork*, and it breaks down into three points:

1. *The instruments in every Taylor Packaged Unit are designed from the very beginning to work together.*
2. *You have the economy and dependability of simple air-operated control.*
3. *You have a complete control system in one neat, compact package . . . good housekeeping*



for your plant and easy maintenance for your men.

Ask your Taylor Field Engineer! He'll analyze your problem, then he'll turn the job over to Taylor Application Engineers—specialists in instrumentation. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

NATURAL and SYNTHETIC RUBBER LATEX and LATEX COMPOUNDS

Available as Prevulcanized, Vulcanizable, or Unvulcanized

We supply natural and synthetic rubber latex and latex compounds for hundreds of products in over twenty industries. If you are bonding, coating, impregnating, saturating, extruding, flocking, molding, casting, or dipping, we can offer you industrially proven compounds. For new and special purposes we are prepared to develop new compounds.

INDUSTRIAL ADHESIVES

- Aluminum Foil
- Bandage
- Bookbinding
- Combining Fabrics
- Cork
- Dri-Seal
- Fiber Bat
- Flocking
- Library Paste
- Masking Tape
- Paper
- Pressure Sensitive Tape

SHOE ADHESIVES

- Foxing
- Heel Cover
- Sole Attaching
- Sole Laying

IMPREGNATION

- Box Toes
- Curled Hair
- Fabric
- Flame Proofing
- Napped Fabrics
- Paper
- Rug Sizing
- Rug Underlays
- Thread
- Tire Cord



MISCELLANEOUS

- Allergy Pillow and Mattress Paint
- Casting and Molding
- Chewing Gum
- Advertising Novelties
- Flexible Molds
- Flooring
- Mannequins
- Rubber Dolls

COATINGS

- Bath Mats
- Canvas Gloves
- Felt
- Fishermen's Garments
- Metal
- Occupational Clothing
- Paper
- Pile Sealing
- Raincoats
- Sheeting
- Tank
- Wire Goods

DIPPED GOODS

- Baby Pants
- Balloons
- Bathing Caps
- Bladders (Football, Soccer, Basketball)
- Diaphragms
- Finger Cots
- Footwear
- Household Gloves
- Ink Sacs

- Nipples
- Prophylactics
- Sheeting
- Surgeon's Gloves
- Toy Balloon Outfits
- Toys



MARKING ITS GOLDEN ANNIVERSARY,
COLUMBIA SALUTES THE
GREAT INDUSTRIES IT SERVES

The past fifty years constitute an era for American industry which is without parallel in the history of the world. Industrial technical progress and physical expansion have helped to save the nation in two great wars . . . and have enabled its people to enjoy great benefits that should be a constant reminder of the value of the free enterprise

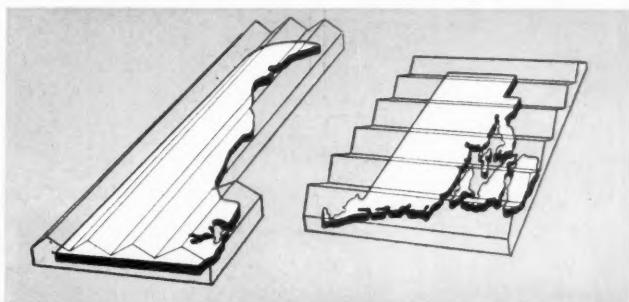
system through which these advantages have been obtained.

Columbia is proud of its fifty years of service to so many of the great basic industries of the nation. It looks forward to keeping pace with the new progress which these industries are now beginning. Pittsburgh Plate Glass Co., Columbia Chemical Division, Fifth at Bellefield, Pittsburgh 13, Pa.

MILLIONS OF TONS OF ALKALIES FOR ALUMINUM • CHEMICALS • DRUGS • EXPLOSIVES • FOODS •
GLASS • PETROLEUM • PLASTICS • PULP AND PAPER • RAYON • RUBBER • SOAP • STEEL • TEXTILES

Since 1899, when its first plant began operations at Barberton, Ohio, Columbia has produced vast quantities of alkalies and related products which, at some stage, have entered into the production of almost every product essential to modern living.

*50 Years of Service
to the Nation's Basic Industries*



COLUMBIA

CHICAGO
NEW YORK

BOSTON
CINCINNATI

MINNEAPOLIS



CHEMICALS

ST. LOUIS
CLEVELAND

PITTSBURGH
PHILADELPHIA

SAN FRANCISCO

PAINT • GLASS • CHEMICALS • BRUSHES • PLASTICS

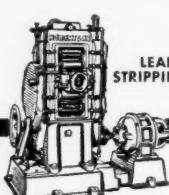
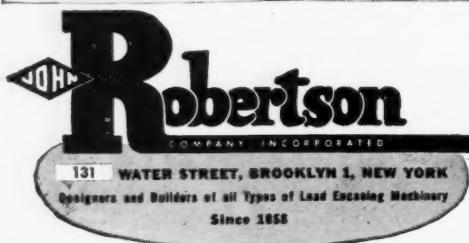
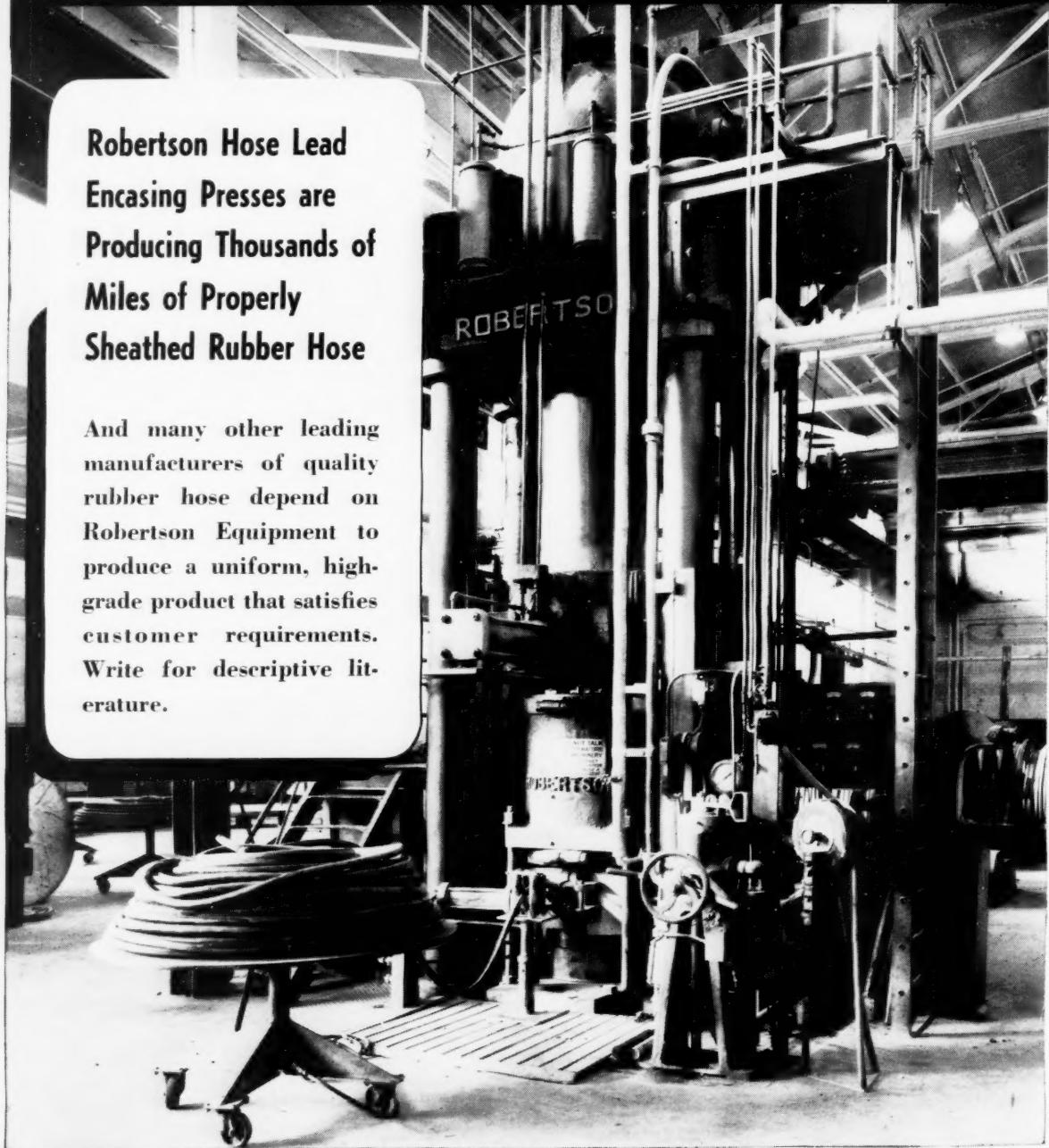


PITTSBURGH PLATE GLASS COMPANY

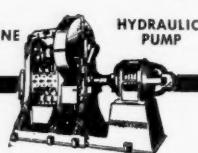
In the HEWITT-ROBINS plant...

**Robertson Hose Lead
Encasing Presses are
Producing Thousands of
Miles of Properly
Sheathed Rubber Hose**

And many other leading manufacturers of quality rubber hose depend on Robertson Equipment to produce a uniform, high-grade product that satisfies customer requirements. Write for descriptive literature.



LEAD SHEATH
STRIPPING MACHINE



HYDRAULIC
PUMP



OPEN LEAD
MELTING POT

GET QUALITY IN QUANTITY

By the Pail, Drum or Tank Car, Flintkote can supply top quality adhesives to improve your product or processing

Let us help you solve production problems in coating, lamination, cementing, sealing, saturating or related processes.

Take a good look at the Flintkote line. Chances are a standard Flintkote product or an available formula will fit your requirements.

Look over the various types . . . crude, synthetic and reclaimed rubbers . . . natural and synthetic resins . . . asphalt emulsions and cutbacks.

They're available in many forms . . . water dispersion types (non-inflammable) . . . solvent solution types . . . hot melt types and latex compounds. For roll coating, trowel, brush or spray application.

Do you work with metals, fiber, ceramics, paper, textiles? Do you want a product for end use . . . or for formulating and resale?

Whatever your requirements, you may save important time and money with a Flintkote product . . . either standard, or one we've made up just for you.

Our research, development and manufacturing facilities are at your service.

THE FLINTKOTE COMPANY

Industrial Products Division

30 Rockefeller Plaza, New York 20, N. Y.

ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES
NEW ORLEANS • WASHINGTON • TORONTO • MONTREAL

FLINTKOTE
Products for Industry



All is not Gold . . .



"DOC" MacGEE SAYS: Appearances are often deceiving; things aren't always what they seem to be. Yet, sooner or later, truth will out; the genuine article outshines the imitation.

That's why, year after year, more and more users of industrial naphthas switch to SKELLYSOLVE. For nearly 20 years, SKELLYSOLVE has proved its ability to help save money, improve operations, and produce better products in various industrial fields using naphthas.

Pioneering in the large-scale production of the hexane, heptane, and octane type naphthas from natural gas, Skelly Oil Company today produces a complete, comprehensive line of specialized solvents of exceptional quality.

Uniformity, purity, close boiling ranges, minimum of unsaturates and aromatics, freedom from foreign tastes and odors, dependability of supply . . . these are SKELLYSOLVE qualities that are widely imitated but seldom matched. So why bother with something claimed to be "just as good as" or even "better than" SKELLYSOLVE.

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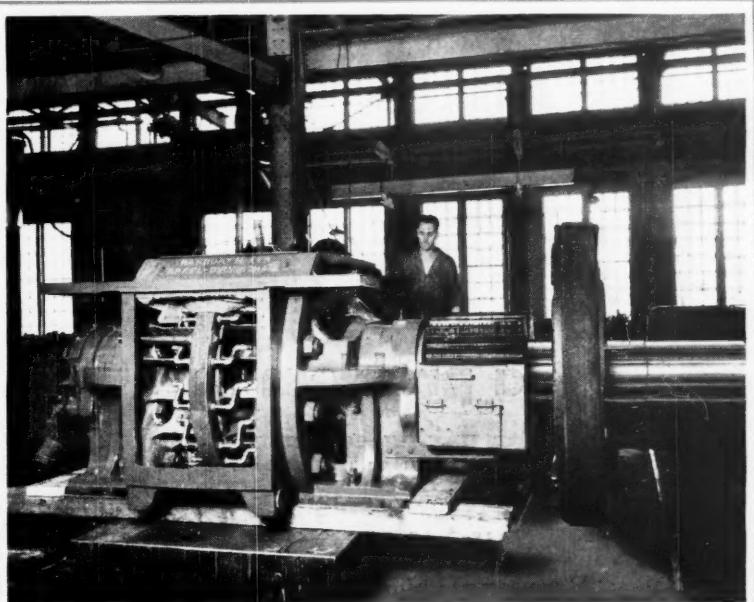
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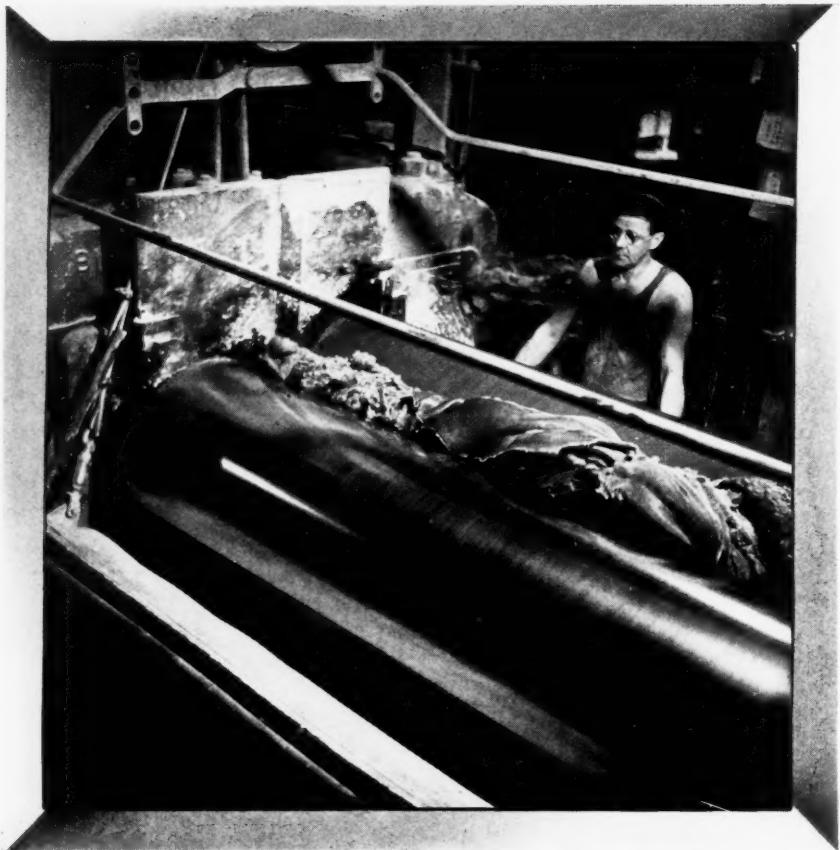
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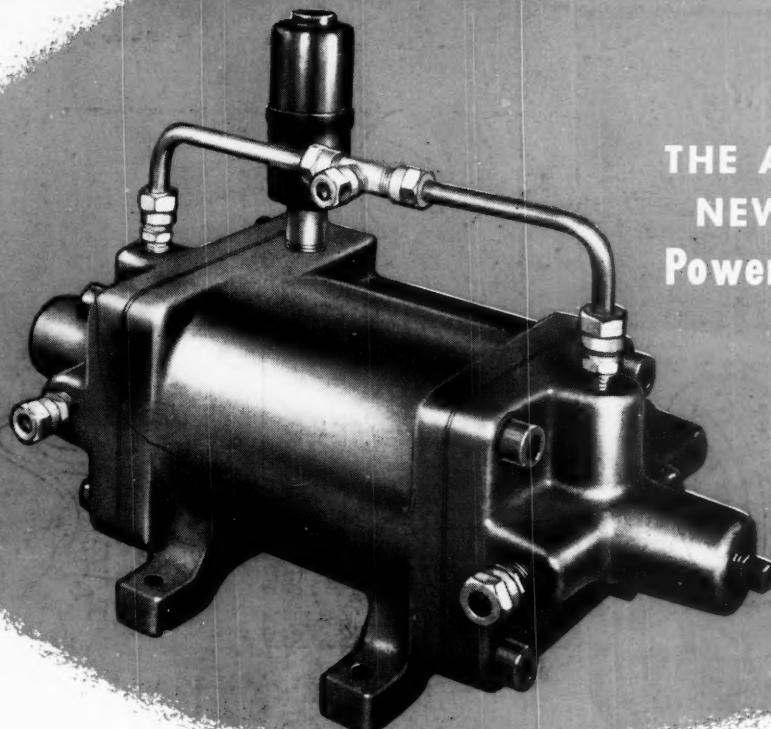
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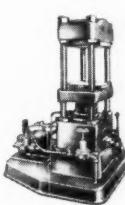
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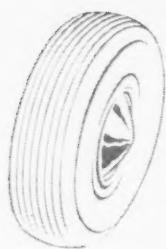
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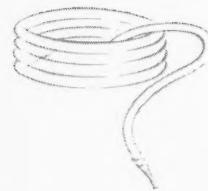
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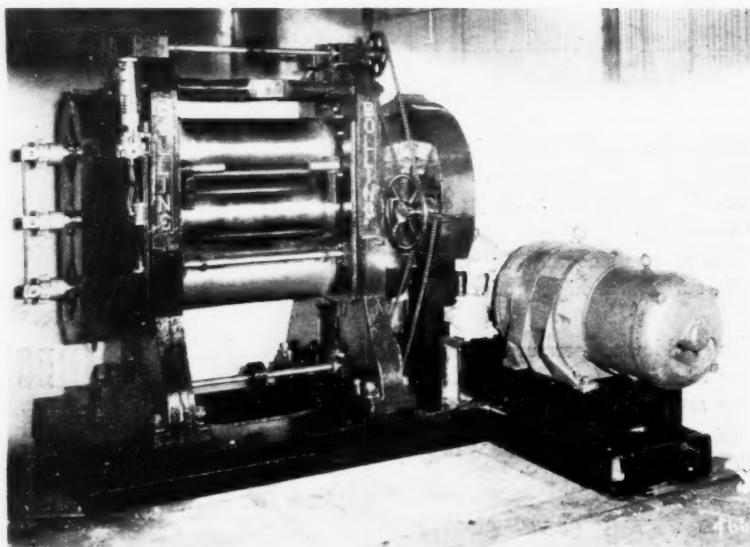
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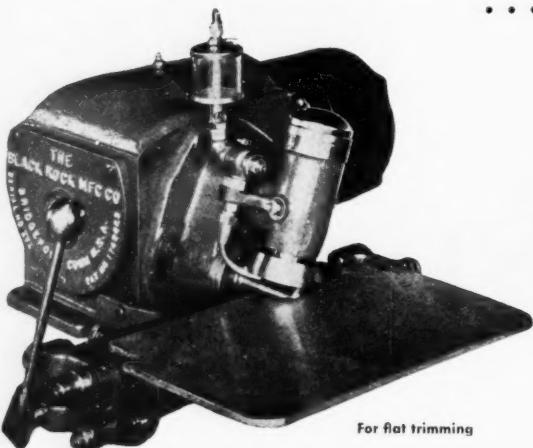
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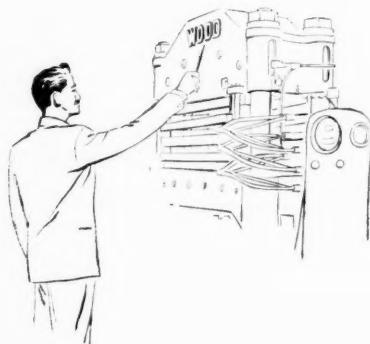
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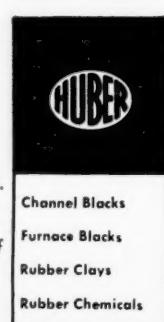
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September, 1949

Volume 120

Number 6

A Bill Brothers Publication

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Published monthly by Bill Brothers Publishing Corp. Office of publication, Orange, Conn. Editorial and executive offices, 386 Fourth Ave., New York 16, N. Y. Chairman of Board and Treasurer, Raymond Bill; President and General Manager, Edward Lyman Bill; Vice Presidents, Randolph Brown, B. Brittain Wilson, C. Ernest Lovejoy.

Chicago Office: 333 N. Michigan Ave.—
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Subscription price—United States and Mexico, \$3.00 per year; Canada, \$4.00; all other countries, \$5.00. Single copies, 35¢. Other Bill Publications are: FOUNTAIN SERVICE, GROCER-GRAPHIC, PREMIUM PRACTICE, RUG PROFITS, Sales Management, TIRES Service Station.



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High-Temperature Mixing of Fully Reinforcing Carbon Blacks in Synthetic and Natural Rubbers—I

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RUBBER WORLD

Volume 120

New York, September, 1949

Number 6

High-Temperature Mixing of Fully Reinforcing Carbon Blacks in Synthetic and Natural Rubbers—I

Isaac Drogin,¹ Hester R. Bishop,² and Paul Wiseman²

RECENT INFORMATION⁽¹⁾ on the roadwear performance of natural rubber, regular GR-S, and low-temperature GR-S tire treads indicated that high abrasion furnace black (HAF), made from oil, is very effective toward making low-temperature GR-S tire treads wear best. A short time previously Braendle⁽²⁾, Sweitzer^(2,3), and Steffen^(2,4) reported that the very fine furnace black (VFF), made from natural gas, does best in "cold rubber" when processed by standard, efficient, high-speed, and hence high-temperature, methods.

Dannenberg and Collyer⁽⁵⁾ also reported then that the properties of channel black in low-temperature rubber are improved markedly by the use of high-speed high-temperature Banbury mixing; whereas the properties of fully reinforcing furnace blacks are affected to a lesser degree; also that in low-temperature GR-S, calcined channel black possesses about the same laboratory abrasion resistance as fully reinforcing oil-base black.

In view of the great technical interests involved in the use of high temperature methods in the mixing of carbon black-rubber stocks, the authors of this paper undertook to show the effects of mixing a number of fully reinforcing carbon blacks in low temperature GR-S, in regular GR-S, and in natural rubber, over a wide range of temperatures.

Literature Survey

The following is a rapid survey of references in the literature within the past decade in connection with the milling, mixing, or treatment of rubber stocks at high temperatures to improve the physical properties of the vulcanizates of such stocks.

Gerke *et al*⁽⁶⁾ heat-treated channel black-rubber mas-

IN VIEW of the recent interest in the high-temperature mixing of carbon blacks in natural and synthetic rubbers, the authors believe that the data presented herewith are timely and informative. It should, however, be pointed out that the carbon blacks herein studied possess various characteristics, and when these blacks are mixed at temperatures normally employed, the results of tests on the physical properties of the vulcanizates differ from those obtained in this work, which deals primarily with mixing at high temperatures. The conclusions based on tests made after mixing at higher than normal temperatures may therefore be at variance with those obtained with the same carbon blacks mixed at normal temperatures.

terbatches in the range from about 300 to about 370° F. for from 10 to about 60 minutes. The result was an improved product characterized by high resistance to abrasion, relatively greater softness, relatively lower modulus at low elongation, relatively higher modulus above 300% elongation, low hysteresis, and high electrical resistivity.

Four British patents⁽⁷⁾, granted to United States Rubber Co., relate to improvements in the technique of processing high carbon black-rubber mixes prior to vulcanization thereof. The mixes are heated to a temperature within the range from about 300 to about 370° F. The effects of the heat process are greatly accelerated by the incorporation of certain organic chemical compounds in the rubber, viz., a quinone oxime compound; or a di (primary) amine; or a primary amido derivative of carbonic acid; or aromatic nitroso compounds. The resulting stocks possess higher abrasion resistance, toughness, flexibility, high electrical resistivity, and low hysteresis.

Another British patent⁽⁸⁾, granted to Firestone Tyre & Rubber Co., Great West Road, Brentford, Middlesex, England, reveals a process which involves the heating of a rubber-carbon black masterbatch in an inert atmosphere at a temperature between about 260 to 360° F. "for a

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³ Numbers in parentheses refer to Bibliography items at end of this installment.

time (from two to six hours) such that flocculation and migration of the pigment causing stiffening of the composition has taken place to form a first network of rubber reinforced with a high percentage of the pigment, interlocking and interspersed with a second network of rubber reinforced with a correspondingly low percentage of the pigment." It is claimed that the resulting rubber composition, while softer in the vulcanized state than the same composition processed by ordinary means, has a higher modulus, a lower permanent set, greatly enhanced wear or abrasion-resisting qualities, and normal tensile strength.

According to Haehl and Le Bras(9), the temperature of milling has a great influence on the elasticity; above 150° F. this influence is manifest in the fact that the plasticized mixtures have more "nerve," and an increase in temperature decreases the effect of mastication.

Piper and Scott(10) state that the results emphasize the bad effect of allowing GR-S to become excessively hot when worked in an internal mixer. The high temperature causes the material to become tough and nervy. Therefore, in processing butadiene-styrene copolymer, these authors point out that the application of heat in the absence of oxygen or mechanical working should be avoided because it produces an effect similar to scorching and produces changes tentatively ascribed to cross-linking of the chain molecules and also causes stiffening and an increase in nerve. The subjection of natural rubber to temperatures between about 300 and 480° F. increases nerve, as shown, for instance, by higher elastic recovery; and in high-temperature breakdown in an internal mixer, the mechanical action is probably aided more by thermal breakdown because the temperatures used (320 to 390° F.) are sufficient in themselves to produce some plasticization.

Vila(11) reported that the breakdown of the raw GR-S polymer on a hot mill produces compounds which taste better and smoother and exhibit less swelling at the die. The hot plasticization reduces Mooney viscosity, but at the same time decreases the solubility of the polymer in benzene. These effects are attributed to the formation of a cross-linked structure (gel phase) accompanied by chain scission. The physical properties of the vulcanizate were deteriorated in proportion to the time of breakdown.

Neal and Ottenhoff(12) point out that, as the temperature of milling GR-S increases, surprising results appear in the recovery curve. Apparently the first effect of milling at high temperature is a marked increase in recovery. The maximum in the recovery *versus* time-of-milling curve occurs after about 10-minute milling, and the magnitude of this maximum apparently increases as the temperature of milling increases. After longer milling the effect has entirely disappeared, and recovery shows a normal value. Recovery has frequently been associated with gel formation, and it is possible that the first effect of increased temperature is to cause rapid gel formation. Further mechanical action finally breaks down the gel to a polymer with low recovery. The data show that the marked increase in recovery on short milling at high temperatures is characteristic of GR-S.

Driskell and Kracke(13) show the effect of hot and cool milling on the GR-S type of polymer and also present a curve showing the regression of gel plasticity on Mooney viscosity. It is possible that the mastication, while resulting in chain scission and consequent reduction in plasticity number, also forms polar molecular fragments, which associate in concentrated xylene solution to cause a smaller drop in gel plasticity number than would be predicted from the Mooney number of the masticated GR-S.

Garvey, Whitlock, and Freese(14) state that synthetic rubber differs from natural rubber in several important respects. The former is tougher and, consequently, tends to become hotter on the mill. Also, it is shorter and less thermoplastic. The mill breakdown is probably related to the heat softening action. The synthetic rubber does not break down so much as natural rubber. Considerably more milling is necessary for adequate breakdown, and the breakdown is less obvious. The best breakdown and mixing are obtained on cool, tight mills. In general, longer milling is necessary with synthetic rubber than with natural rubber. At the same time "heat history" should be kept at a minimum.

Taylor(15) emphasizes the importance of processing at low temperature and points out that improper cooling of mill rolls may contribute to the following production problems: (1) stocks too hot to handle conveniently; (2) poor quality of vulcanized stock; (3) partially scorched stock; (4) loss of softener due to evaporation; (5) sticking of stock to mill rolls; and (6) extended mixing cycles, due to the reasons above and to waiting for the mill to cool before starting a succeeding batch. The importance of processing stocks at low temperatures was recognized with crude rubber; with the widespread use of synthetic this need has been greatly emphasized. Synthetic stocks are generally more scorchy than natural rubber stock, and their processing temperatures are more critical.

Juve(16) indicates that GR-S may be plasticized by hot or cold mastication on mills, by hot air treatment, or by passing through a Gordon plasticator. The changes that take place on heating are attributed to two competing reactions. During the early portion of the treatment, oxidative breaking of the molecules predominates; in the latter portion, "oxygen vulcanization" predominates. Some degradation in physical properties determined after vulcanization accompanies the first type of reaction, and considerably more takes place during the second. Cold milling may not involve any "oxygen vulcanization."

Parkinson and Blanchard(17) state that among the changes in physical properties of vulcanizates produced from heat-treated rubber-black stocks are a decrease in hysteresis (increase in resilience), a small decrease in tensile and tear strength, a reduction in hardness, and a small increase in abrasion resistance. The effect of heat treatment on GR-S-channel black compounds is, in general, similar to that on natural rubber. The data show that the effect on hardness and resilience of heating the reinforcing furnace black stocks is less than that of heating the channel black stocks. Tear resistance, as usual, seems to suffer by heat treatment; the decrease is similarly marked for each stock. The effect of heat treatment is still less marked on high modulus furnace black stocks than on reinforcing furnace black stocks. Mixtures of relatively coarse blacks, such as semi-reinforcing furnace, do not respond to heat treatment as do rubber-channel black mixtures; the physical properties of the vulcanizates are comparatively unaffected. The incorporation of benzidine, urea, and thio-urea into channel black-rubber stocks and subsequent heat treatments of the stocks at a steam pressure of 70 pounds per square inch (158° C.) gave results indicating that the effects of heat treatment and benzidine are additive.

Braendle, Sweitzer, and Steffen(2) present a graph which shows that "normal factory processing temperatures (300 to 375° F.) develop with very fine furnace carbon the full modulus required for wear, but not the excessive stiffness which entails dangerous shortness." The conclusion is reached that "the scorch and processing handicaps of cold rubber have been overcome through

the use of Statex K and that 'cold rubber' treads compounded with this black combine trouble-free processing with maximum roadwear, flex life, and aging."

Steffen (5) concludes that costly expedients for cold-processing low-temperature GR-S are not required when very fine furnace carbon is employed as the reinforcing medium, and that this carbon is at its best in "cold rubber" when processed under high-temperature conditions (about 375° F.), thus permitting high-speed, efficient mixing. So processed, the "very fine furnace carbon-cold rubber" tire gave 5% better roadwear than a tire made from a stock of similar Mooney containing fine particle oil carbon.

Busse and Cunningham (18) summarized their findings with the statement that the rate of breakdown of smoked sheet, pale crepe, and sprayed-latex rubber in a laboratory internal mixer is at a minimum at temperatures around 240° F., and the rate may be increased as much as four- or five-fold by either raising or lowering the temperature 80° F.

Weigand and Braendle (19) state that hot milling of GR-S shortens and reduces heat and flex properties. Cold refining lengthens GR-S and improves these properties, but does not protect against subsequent damage from heat. GR-S shortened by heat cannot be restored by subsequent cold refining. The benefits of cold refining apply also to the completely formulated tread. The fact that such a striking all-around quality improvement takes place at about 50 cold refinings with rolls at 80° F., stocks at about 120° F., suggests the importance, in the fabrication of GR-S tires and other products subject to dynamic usage of (a) avoidance of elevated temperatures at all stages, and (b) further study of the remedial effects of strenuous mastication or refinement of GR-S tread-type carbon in reinforced stocks to low-temperature conditions.

Carlton and Reinbold (20) state that all mixing and remilling should be done at as low a temperature as possible. If mixing temperatures rise above 200° F., the physical properties of the compound are depreciated. Cool water should be used throughout the mixing and remilling cycles. Close mill settings are desirable. GR-S requires more mechanical preparation to put it into shape for factory processing than does natural rubber.

Schade and Roth (21) state that it has also been noted that the properties of a compounded stock and of the resulting vulcanizate depend upon the temperatures of the batch during the mixing process. Consequently specification limits have been set up for the temperatures of the mill rolls during mixing. EPC black favors low mixing temperatures, total power loads, and low Mooney viscosities.

Schoene, Green, Burns, and Vila (22) state that concurrent with the improvement in processing obtained with hot-milled polymers was a corresponding sacrifice in some physical properties. Moreover the hot plasticization technique was time consuming and expensive. These facts led to the attempt to duplicate and surpass the effects of plasticization by exercising greater control of molecular structure of the polymer during plasticization.

Dannenberg and Collyer (5) prepared black masterbatches of low-temperature GR-S with medium processing channel, high abrasion furnace, and very fine furnace blacks in a Banbury at different rotor speeds and mixing time in order to obtain a range of mixing temperatures. They point out that the increase in Mooney viscosity of the medium processing channel and high abrasion furnace black masterbatches at the higher processing temperatures is almost eliminated in the final tread stocks. The sharp rise in modulus of the channel and high abrasion furnace black stocks indicates greater response to high tempera-

ture mixing than is the case for the very fine furnace black. The differences in resilience and hysteresis between the channel black and the high abrasion furnace black are eliminated to a great extent at the higher processing temperature. Another effect of importance is the extremely high electrical resistance for both medium processing and high abrasion furnace blacks. Higher processing temperatures result in an improvement in laboratory abrasion resistance, but, again, the response of the channel black is the most pronounced. According to these authors, the calcining of channel black at 1400° F. for 30 minutes in an inert atmosphere of nitrogen yields a black characterized by increased curing rate, definitely higher modulus, shorter breaking elongation, and about 10% improvement in abrasion resistance, when compared in low-temperature GR-S to reinforcing furnace-type blacks.

Sweitzer, Goodrich, and Burgess (3) show that the gel-forming temperature of milled GR-S polymer is around 300° F.; that with both the high abrasion furnace and the very fine furnace black masterbatches, the carbon gel increases with increased stock temperature, but at a slightly faster rate and at a higher level in the case of the high abrasion furnace black. The additional gel rubber forms progressively as the mixing temperature is raised. The initial high-carbon-gel level for the high abrasion furnace black masterbatch is attributed to a more active particular chemical activity in the formation of gel. The very fine furnace black is less active than the high abrasion furnace black in this gel-forming property. The effect of mixing temperature on the Mooney viscosity of "cold rubber" follows the same pattern developed in the carbon-gel studies. The Mooney viscosity increases with stock temperature. The modulus of very fine furnace black can be brought to the level of the high abrasion furnace black by raising the mixing temperature for the very fine furnace black stock approximately 50° F. Carbon blacks whose activity in carbon-gel formation can be controlled by mixing at higher temperatures possess certain processing advantages and higher elongation, when brought to the same modulus level of the more active black. The result has been the development of "cold rubber" tires with very fine furnace black which compare very favorably for roadwear with tires containing high abrasion furnace black.

Parkinson (23) refers to work done in the English Dunlop laboratories in connection with the heat treatment of stocks. In one form of heat treatment, the stock, which had previously been mixed either in an open mill or in an internal mixer, was heated in a pan under steam pressure at a temperature of 316° F. After heating, the stock was cooled, and the mixing of the final compound was completed in an open mill. In another type of heat treatment the rubber, carbon black, and softener were mixed in a hot Banbury, followed by cold-milling and addition of further ingredients. This process, according to the author, is a difficult type as the Banbury has to be maintained at a temperature of about 310° F. for a period of at least 30 minutes. The conclusion is reached that heat treatment of rubber black stocks increases the resilience of the final vulcanizates and that the highest resilience is obtained when the heat treated stocks consist of rubber and black only. Higher abrasion resistance figures have usually been obtained on heated stocks than on stocks not heat-treated.

Holbrook and Fitzgerald (24) undertook a study to determine what, if any, might be the adverse effects of processing temperatures of the order of 360° F. upon the stability of representative and commonly used accelerators. The authors report that in high-speed Banbury mixing temperatures may be generated at sufficiently high

levels at least partially to damage some rubber accelerators and decrease their effective activity. Thiazoles, thiazole derivatives, and activated thiazoles show little loss of activity. Thuirams and di-thiocarbamates may be severely affected. Guanidines, as represented by diphenyl-guanidine, are only moderately affected. Aldehyde amines range in stability from moderate to good.

Scope of Investigation

The scope of the investigation reported herewith deals with establishing the processing, bound rubber, gel, and reinforcement of GR-S X-478 (41° F.), GR-S-10 (122° F.), and natural rubber when Banbury mixed alike with five fully reinforcing carbon blacks at various maximum stock temperatures. Each polymer was mixed respectively with the easy processing channel black (EPC), Kosmobile 77-Dixiedensed 77; the very fine furnace (VFF) gas-base black, Statex K; the reinforcing furnace (RF) oil-base black, Kosmos 60-Dixie 60; and the high abrasion furnace (HAF) oil-base blacks, Phil-black 0 and Vulcan 3. Five mixings were made of each carbon black with each GR-S polymer, and four mixings were made of each carbon black with natural rubber. Banbury temperatures were specially controlled for each mix. The maximum temperatures of the GR-S X-478 stocks ranged from 265 to 437° F.; those of the GR-S-10 stocks ranged from 280 to 440° F.; and those of the natural rubber stocks ranged from 264 to 442° F.

Experimental Details

Carbon Blacks

Details pertaining to the five carbon blacks studied are presented in Table 1. One black was produced by the channel process, and four by the furnace process. Natural gas served as the basic fuel for two of the blacks, petroleum oil cracked distillate as the basic fuel for three of the blacks.

Rubbers

The synthetic polymers were represented by GR-S-10 made at 122° F. and GR-S X-478 made at 41° F.

Formulations

The compounds used are shown in Table 2. A tread type of formulation was employed in the study of the various carbon blacks and polymers. The carbon black loading was 50 parts by weight per 100 parts of rubber hydrocarbon. The amount of softener and accelerator was adjusted for each carbon black.

Mixings

The carbon blacks, with the rubber, zinc oxide, antioxidant, and softener, were mixed in a laboratory-size Banbury B with a capacity of 1,355 grams at 1.25 specific gravity. The batch weight was 1,200 grams. The rotor speeds were 115 r.p.m. for the front rotor and 102 r.p.m. for the back rotor, or a ratio of 1.127. The sulfur and the accelerator were added on a six- by 12-inch two-roll laboratory mill. To obtain maximum stock temperatures between 260 and 280° F., ice water was used; between 280 and 290° F., line water; between 290 and 330° F., line water and steam; and above 330° F., steam up to 85 pounds' pressure was used. On all tests the Banbury was conditioned for 30 minutes at the temperature to be used before the mixing was started.

The mixing cycle for all the carbon blacks in GR-S and natural rubber was 15 minutes, based on the following schedule:

Ingredients	Cycle (Minutes)
Polymer	0
Zinc oxide and antioxidant	3
$\frac{1}{2}$ Black	5
$\frac{1}{2}$ Black	7
$\frac{1}{2}$ Black	9
Softeners	11
Discharge	15

Accelerator and sulfur were added on a six- by 12-inch two-roll laboratory mill for $7\frac{1}{2}$ additional minutes.

Processing

The following tests were concerned with establishing stock temperatures, power requirements, viscosities, shrinkage, Mooney scorch, and rates of extrusion.

STOCK TEMPERATURE. The temperature of the stock in the Banbury was obtained with a thermocouple projecting into the mixing chamber from the bottom for approximately $3\frac{1}{8}$ inch. The temperature was recorded on a Brown electronic strip chart-recording potentiometer with a chart speed of 39 inches per hour. The temperature recorded at the eleventh minute of the mixing cycle, and prior to the addition of the softeners, was considered the maximum.

POWER CONSUMPTION. The power consumption was obtained from a General Electric dial-type, two-wire, D.C., watt-hour meter with ten-watt graduations, having a capacity of 15 amperes at 230 to 240 volts. The power consumption was recorded on an Esterline Angus graphic wattmeter with a chart speed of 44 inches per hour.

MOONEY VISCOSITY. The viscosity was determined with a Mooney viscometer, Model NBS, with a rotor $1\frac{1}{2}$ inches in diameter and with platens steam-heated at 212° F. Only the four-minute reading was reported.

SHRINKAGE, MILL STOCK. This was determined by measuring the shrinkage in the length of a stock taken off the mill. The procedure follows. At the end of the $7\frac{1}{2}$ -minute mixing period

TABLE I. BASIC DATA ON THE FULLY REINFORCING CARBON BLACKS USED IN THE MIXING OF VARIOUS POLYMERS

Brand	Type	Producer	Process	Basic Fuel	Surface Area (Sq. M./Gram)	Calculated Diameter (Millimicrons)	% Volatile Matter	pH
Kosmobile 77-Dixiedensed 77	Easy Processing Channel (EPC)	United Carbon Co., Inc.	Channel	Natural gas	109.7	28.3	5.7	4.9
Statex-K	Very Fine Furnace (VFF)	Columbian Carbon Co.	Furnace	Natural gas	78.6	39.4	1.7	8.5
Kosmos 60-Dixie 60	Reinforcing Furnace (RF)	United Carbon Co., Inc.	Furnace	Petroleum oil	100.3	31.2	0.8	9.1
Philbrick 0	High Abrasion Furnace (HAF)	Phillips Chemical Co.	Furnace	Petroleum oil	75.8	41.0	1.2	8.4
Vulcan 3	High Abrasion Furnace (HAF)	Godfrey L. Cabot, Inc.	Furnace	Petroleum oil	80.6	38.8	1.7	8.0

TABLE 2. TREAD-TYPE FORMULATIONS USED IN THE MIXING OF FULLY REINFORCING CARBON BLACKS IN VARIOUS POLYMERS

	GR-S X-478			GR-S-10			Natural Rubber		
	Kosmos 60-	Dixie 60,	Kosmos 60-	Dixie 60,	Kosmos 60-	Dixie 60,	Kosmos 60-	Dixie 60,	Kosmos 60-
	Kosmobile 77,	Philblack 0,	Kosmobile 77-	Philblack 0,	Kosmobile 77-	Philblack 0,	Kosmobile 77,	Philblack 0,	Kosmobile 77,
	Dixiedensed 77	Vulcan 3	Statex-K	Dixiedensed 77	Vulcan 3	Statex-K	Dixiedensed 77	Vulcan 3	Statex-K
Rubber.....	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Carbon black.....	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Zinc oxide.....	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Stearic acid.....	2.00	2.00	2.00	2.25	2.00	2.00	2.00	2.00	2.00
Flexamine.....	1.30	1.30	1.30	...	...	...	1.30	1.30	1.30
Pine tar.....	...	...	...	...	...	...	5.00	7.00	6.00
Sulfur.....	1.75	1.75	1.75	1.75	1.75	1.75	2.40	2.25	2.25
Santocure.....	1.40	0.95	1.30	1.40	0.95	1.30	0.65	0.45	0.55
Circlo oil.....	5.00	4.50	4.00	3.00	2.20	1.70	...	...	...
Parafux.....	4.00	3.50	3.00	2.00	1.80	1.30	...	...	...
TOTAL	168.45	167.00	166.35	162.40	161.70	161.05	164.35	166.00	165.10

of the stock on the two-roll laboratory mill, during which time the accelerator and the sulfur were added, the mill roll gage is set at 0.055-inch for sheeting off the stock. But before starting the sheeting operation, the mill is stopped and the shrinkage die—a flat piece of stainless steel four inches wide by six inches long and with a curvature the same as that of the mill roll—is placed lengthwise with the grain of the stock on the front roll, and with the aid of a knife a test piece the size of the die is marked off.

The marked section is then cut out slightly outside the mark; the cut-out piece is allowed to rest 24 hours on a flat talced surface, and the length of the marked test piece is then measured. The shrinkage is the loss in length from the original six inches and is expressed in terms of per cent. of the original length.

MOONEY SCORCH. Scorch values were obtained with a Mooney viscometer, Model NBS, with a rotor 1 3/16 inches in diameter and with platens steamheated at 250° F. The procedure was essentially the same as that outlined by Shearer, Juve, and Musch (25). After a one-minute warm-up the rotor was started; the initial maximum reading on the dial was recorded as well as the readings at each 30-second interval following. The test was continued until the dial reading reached a minimum and then went up one point. The time in minutes required to reach that point was recorded as the scorch value.

RATE OF EXTRUSION. The rate of extrusion was measured on a laboratory-size Housatonic extruder equipped with a cylindrical die containing a 3/64-inch opening. The head and the barrel were kept at 200° F. The time was started as the first of the sample entered the tuber, and the stock which was extruded between the third and the fifth minute was weighed, and the result divided by two constituted the weight of stock in grams extruded per minute.

Determination of Gel and Bound Rubber Content

The procedure used for this work was a modification of the one suggested by L. R. Sperberg (26). A two-gram sample of the fully compounded stock was placed in a weighed wire basket one inch in diameter and 2 1/2 inches long and made of 300-mesh bronze screen. The basket containing the stock was immersed into benzene and left there at room temperature for 48 hours. It was then removed from the benzene, dried, and weighed. The rubber remaining in the basket was the gel rubber plus the carbon black which it contained. The bound rubber was calculated as per cent. on the rubber hydrocarbon according to the following equation:

$$\% \text{ Bound Rubber} = \frac{\% \text{ Gel} - \% \text{ Benzene-Insoluble Material}}{\% \text{ Rubber Hydrocarbon in Sample}} \times 100$$

Reinforcement

MODULUS, TENSILE STRENGTH, AND ELONGATION AT BREAK. The procedure followed was in accordance with the specifications of ASTM D412-41, adopted in 1944, and using the Henry L. Scott machine.

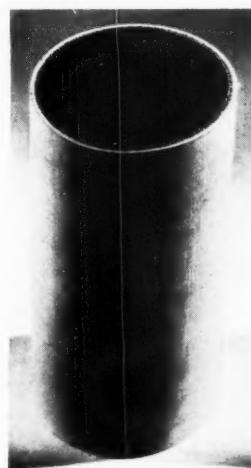
RESISTANCE TO FLEX CRACKING. The tests were made on the De Mattia flexing machine in accordance with the procedure of ASTM D813-44 T, issued in 1944. Each strip was initially punctured completely through with a slit-type needle in place of the ASTM 0.05-inch diameter round needle. The slit was 0.125-inch wide. The extension was one inch, and the bend 1/2-inch. The stocks were aged in the Geer oven 48 hours at 100° C. prior to testing.

RESISTANCE TO ABRASION. A modified Goodyear angle abrasion was used. The abrasion wheels were 3 1/2 inches in diameter and 3/4-inch thick. They were set at an angle of 11 degrees ahead of the center of the grinding stone. The stone was revolved at 80 r.p.m. with load. The wheels were given a five-minute-break-in grinding and were then weighed. The wheels were abraded four minutes on each of eight positions and were then reweighed. The grinding stone was allowed to cool to room temperature between each run. The loss in weight multiplied by 1.875 was reported as grams loss per hour. Four wheels were used for each sample, and the results presented, in the next installment, are an average of the results for the four wheels.

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- (25) "Measurement of the Scorch and Cure Rate of Vulcanizable Mixtures Using the Mooney Plastometer." India RUBBER WORLD, Nov., 1947, p. 216.
- (26) Phillips Chemical Co., Bartlesville, Okla.

(To be continued)



U. S. Rubber's "Matchless Carbo-lized Fire Hose"

Matchless Carbo-lized Fire Hose, a new high-strength fire hose said to be highly resistant to acids and acid fumes, oil, and gasoline, has been developed by United States Rubber Co., Rockefeller Center, New York 20, N. Y. Marketed in two colors, white or black, the new hose is designed primarily for fire protection and general wash-down service in acid plants and oil refineries, but is also suited for such heavy-duty service as street cleaning and sewer flushing, as well as paving operations.

The hose is constructed with a natural rubber tube, two plies of chemically treated cotton cord fabric, and a neoprene cover. This construction, while enabling the hose to resist 400 p.s.i. test pressure, also permits greater flexibility and light weight. The natural rubber tube is made by an extrusion process which makes possible an extremely smooth waterway. The cotton fabric used in the plies is an adaptation of Ustex cord, widely used in heavy-duty conveyor belts. High acid and oil resistance is imparted by the neoprene cover, which is 5/64-inch thick, heavy enough to resist abuse and abrasion, yet light enough to avoid bulkiness.

Application of Punched Cards to Indexing Rubber Compounds

Kathleen S. Rostler²

WITH the continually accelerated pace of scientific research and of accumulation of results from this research, the problem of recording and indexing of data is becoming more and more acute. The efforts put into scientific investigations are likely to be wasted through the difficulty of finding the results in the great mass of published and unpublished data. This matter is becoming of grave concern to leaders in all fields of scientific endeavor.

One of the most widely discussed and strongly advocated means of alleviating the situation is the use of punched cards. Both machine and manually operated types of cards reduce the problem of finding data to a mechanical operation and make possible efficient indexing and cataloguing on a less cumbersome basis than is possible with other types of indices.

The present paper concerns the application of a manually operated punched-card system to the field of compounding of rubber and the adaptation of this system to a service of cataloguing data published in the literature for the distribution to subscribers. The practical aspects of the service have been presented in a booklet issued by the publishers.³ It is believed that this instance is the first in which an information service has been established in the form of a file of marginally punched cards. A description of the service and the factors which had to be taken into consideration in setting it up are presented in this paper.

Rubber Compounds in the Literature

The compounding of rubber has often been called an art rather than a science, primarily for the reason that experimentally gathered data on composition and properties were for many years closely guarded secrets of compounders and manufacturers. With the entrance of scientific minded, trained chemists into the field of compound-

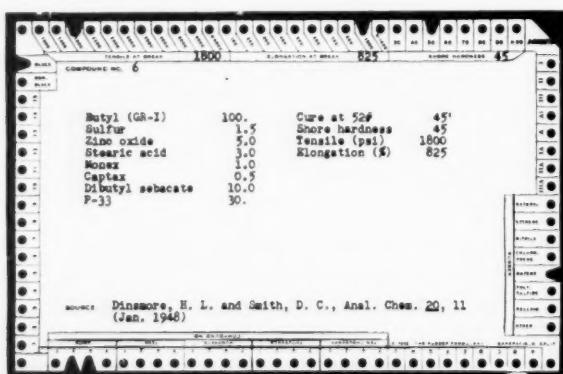


Fig. 1. Sample Card of The Rubber Formulary.

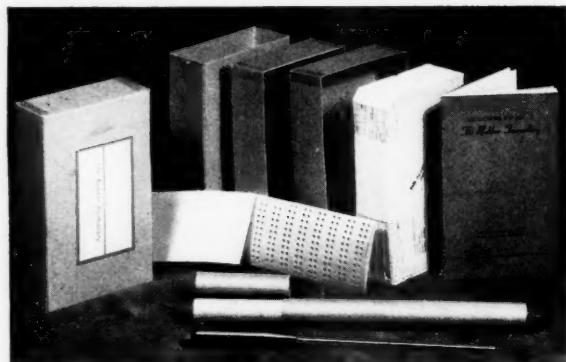


Fig. 2. Example of First Month's Shipment from The Rubber Formulary

ing, this picture has changed considerably. The professional ambitions of chemists and their desire to advance knowledge and further fellow chemists' work in the field have brought about a great number of publications in scientific and technical journals, which report thousands of compounds, their composition and properties. These data, usually spoken of as available published information, are in fact not available because these compounds are nowhere indexed or catalogued. There is no index in the literature which permits the finding of the compounds on the basis of either ingredients or properties other than by that particular ingredient or property which happens to be the subject of the paper, in which case the compounds can be located through a subject index.

The need was recognized some years ago of a systematic compilation of the accumulated data on the properties of rubber. An exhaustive study of all the data published up to March, 1934, was made in England through the co-operative efforts of the Rubber Growers' Association, Inc., and the Research Association of British Rubber Manufacturers, and a 700-page handbook was published.⁴

Data on rubber compounds present a difficult indexing problem because of the variety of ways in which they might be sought in an index. It might be desired later to find this information from the aspect either of the type and proportions of ingredients present or of any of the properties of the resulting mixture. In this handbook the data on compounded rubber were handled by assigning a number to each combination of rubber compounding ingredients published and by using these numbers throughout the chapters on chemical and physical properties of vulcanized rubber. The numerical list of compounds contains page number references to all data reported on that particular compound. Even though this work is exceptionally well cross-indexed and arranged, it is unavoidable that in so comprehensive a book the information is difficult to find. Since the date of publication of this reference work a great deal of new material has been published on the subject of natural rubber, with which the book deals. Nothing of similar nature has been done with the synthetic rubbers.

The author and coworkers began some years ago to develop a system for filing rubber compounding tests by recording each compound on a marginally punched card and found this method admirably suited to the problem in hand. These marginally punched cards have holes punched around the four edges of the card. The compound is written on the face of the card as with an

ordinary file card. For classifying, each hole is assigned a meaning. Those holes corresponding to classifications to which the compound belongs are notched out with a special ticket punch. Cards are later quickly selected from the file by running a needle through the hole representing the desired classification. All the cards which have been notched at this hole fall out. The operation is extremely simple and does not require any equipment except the sorting needle, shown in Figure 2.

It would be aside from the point of this paper to describe in detail the general features or operation of a file of marginally punched cards. The subject has been well covered in the existing literature, particularly in the papers of Cox, Bailey and Casey.⁵ It is sufficient to say that the use of a punched-card file, with a single card for each mixture, allows the compounds to be selected from the file on the basis either of ingredients or of physical properties of interest, or of both.

In view of the success with which the private laboratory results had been filed on punched cards, it was decided that an indexing and cataloguing, by the same method, of the hundreds of rubber compounds published each year would be a valuable addition to the literature on rubber.

Design of Card

The first problem encountered in the preparation of an index for general distribution was to develop a suitable card. Three principal factors had to be taken into consideration.

(1) The card had to be simple enough in design that the operation of the file could be clearly understood from written instructions by users who had never seen a file of this kind before.

(2) In order to be useful for a wide variety of applications, the coding system had to be flexible enough to fit the purposes of rubber chemists in all the various fields of interest, which might be research, factory compounding of any of the multitude of types of rubber goods, service in connection with sales of rubber chemicals, etc.

(3) The classifications in the code had to be chosen so as to divide the compounds into groups of definitely different character.

The card designed to satisfy these requirements is shown in Figure 1.⁶ The card size chosen was five by eight inches, which has the advantage of being a common file size, for which storage drawers are easily available. A card with a single row of punches was chosen in order to keep the coding as simple as possible. Although a double row of punches would have offered opportunity for coding of a larger number of classifications, a card coded on a double row of punches is difficult to use, especially if the code is to be understood from written instructions. Coding can be overdone to a point where it defeats its primary purpose, which is to simplify selection from a file. The double punch invites the setting up of highly complicated codes, as well as coding for non-essential classifications. In order to allow for the wide divergence in interests of users of the file, only a portion of the holes on the card are coded. The balance are left free to permit the individual user to set up codes for his special purposes. In order to make the coding definitive of the general character of the compound, three physical characteristics were chosen for coding - the tensile strength at break, the elongation at break, and the durometer hardness. Indexing of these three physical properties, together with the type of rubber used and whether or not carbon black is used as a filler, makes it possible to select from the file a group of compounds

well defined as to general physical characteristics and, at the same time, to an experienced rubber compounder, presorted as to practical usefulness.

The top of the card is devoted to indexing for the three basic physical properties of the compound - tensile strength at break, elongation at break, and durometer hardness. All three of these properties are directly coded; one hole is assigned in each case to a range which would tend to divide the cards into approximately equal piles. The top figure of each range is shown on the face of the card. In setting up the groups the experimental error inherent in the test method was taken into consideration. Thus, for instance, in the case of the tensile strength, where the experimental error is a percentage of the measured value, the increments were increased with higher values.

In the upper left-hand corner of the card are two holes for classifying as to whether the compound contains carbon black or not. The non-black punch allows all compounds containing no carbon black to be dropped out of the file.

The lower portion of the right-hand edge of the card is devoted to the type of rubber used in the compound. Where the compound contains more than one type of rubber, such as natural rubber and reclaim, both holes are notched.

Each compound is assigned a number so that it can be referred to easily. A portion of the bottom edge of the card is devoted to coding for compound number, using a 1-2-4-7 code.

The system usually used for coding cards of this type allows any digit to be notched without using up nine holes, by notching the combination of numbers which adds up to the one being coded. Thus a "2" is coded by notching "2"; while a "3" is coded by notching "1" and "2," and a "6" by notching "2" and "4," etc. The compound number coding makes it possible to sort the cards into numerical sequence in order to check from time to time that none are missing. Arranging the cards in numerical sequence is done easily and mechanically with the sorting needle. The operation is explained elsewhere.⁷

Selection of compounds on the basis of the five criteria indexed (tensile, elongation, hardness, type of rubber, and black or non-black) will usually take from the file in a matter of minutes a small enough group of cards to be easily sorted by hand for other desired characteristics. The remainder of the holes, I to VIII on the right, 1 to 15 on the left, and A to J across the bottom, are left free for the use of the individual subscriber for coding, if he so desires, according to more specialized groups. In this way the file is made flexible to fit a variety of uses and needs and to allow a compounder to make selection of sub-groups of compounds within the groups selected by the initial coding.

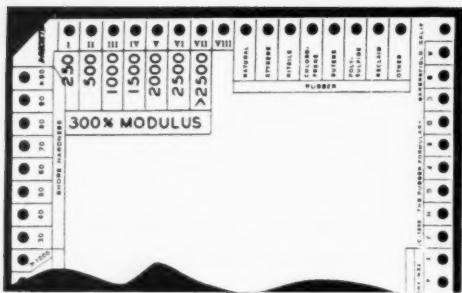
Abstracting Procedure Used by The Rubber Formulary Service

The compounds abstracted and indexed are taken from the more important American and British journals in which articles on rubber compounding appear. Journals are searched each month for articles containing rubber compounds. Only those compounds are used for which the three coded properties, tensile strength, elongation, and hardness, are reported, since a compound on which these three basic properties are not reported

⁵ *Science*, 104, 181 (1946); *J. Chem. Ed.*, 23, 495 (1946), 24, 65 (1947); *Chem. Eng. News*, 23, 1623 (1945).

⁶ This card, designed by The Rubber Formulary, is printed exclusively for its use by Charles R. Hadley Co., Los Angeles, Calif., distributor of Rocket cards.

⁷ "Instructions for Use of The Rubber Formulary," p. 12. The Rubber Formulary, Bakersfield, 1949.



only occasionally the basis of selection of compounds. Such a code may be used in two different ways. A rubber chemist engaged in research who expects to make a study of one of these properties in the future may notch the holes in this classification to mean that this property has been measured on the compound. He can then later select from his file for study all the compounds on which the property has been measured.

TABLE 1. CODING FOR PROPERTIES

- A. Abrasion resistance
- B. Low temperature properties
- C. Compression
- D. Tear resistance
- E. Electrical properties
- F. Flex characteristics
- G. Aging characteristics
- H. Water absorption
- J. Processing characteristics

A factory compounder, on the other hand, or a technical sales representative of a rubber chemical manufacturer who expects to look for compounds for a specific application will be more interested in being able to find those compounds which excel in a particular test. The holes may then be notched to mean good abrasion resistance, good low-temperature properties, low compression set, etc. With this coding, compounds can be selected from the file to fit a specific application.

Coding for Ingredients

Many users of a file of rubber compounds will be interested in selecting compounds from their file on the basis of the compounding ingredients and may use the extra holes for this purpose. The card, furnished, is coded as to composition only for the type of rubber and whether or not the compound contains carbon black as a filler. Codes may be set up for selecting compounds as to the type of filler, the type of plasticizer, the type of accelerator, or any other of the principal ingredients of the rubber compound. These will have to be set up on a direct code since a rubber compound may contain more than one type of filler, more than one type of plasticizer, etc. In a few cases it will be possible to use a numerical code if the coding is limited to the ingredient used in largest amount, such as the principal filler, the principal plasticizer, etc.

Coding for Application

Assignment of the extra holes for specific identification will depend on the special interests of the user of the file. To a rubber manufacturer, probably the most important aspect of a compound is the practical appli-



Fig. 6. Sample Card from Compounding Ingredient Supplier File

cation for which it is suited; a compounding chemist can easily code his file to find compounds on this basis. Unless his manufacture is limited to a very few types of articles, a direct code will have to be used since the same compound may well be useful for several applications. Each hole may be assigned to one specific use, such as hot water bottle, air hose, heels and soles, inner tube, gasket, etc.; the rubber goods listed are those which he may expect to manufacture. Compounds are then classified under the use suggested by the author or under uses which the physical properties of the compound suggest to the individual compounding chemist. A trained rubber chemist is usually able to tell from the properties of a rubber compound for what type of rubber goods it might be most suitable.

Coding for Brands of Products

A manufacturer of rubber chemicals might be particularly interested in utilizing the extra holes for indexing the compounds as to whether or not the ingredients he manufactures had been used. One way of doing this is to assign three holes to the ingredient of interest to him—one hole to be notched if his brand was used; one hole to be notched if a competitive brand was used; and one hole to be notched if no brand is specified. This coding would enable him to find out quickly from his file which authors publish compounds containing his material, which use a competitive product, and how the data differ.

These examples suggest a few of the many ways in which users of a punched-card file of rubber compounds might want to code the file. To go into further detail would be beyond the scope of this paper. Even the few examples cited, however, will serve to illustrate the reason for the decision to leave a large portion of holes on the card free for individual coding by users of the file.

Use of a Code Card

The use of a special coding system based on specific interest is greatly facilitated by preparing a code card showing on the face all the codes used. By the use of this card, notching and sorting can be accomplished almost as easily as if the codes were printed on the cards themselves.

Figure 5 shows a code card used by a manufacturer of rubber compounding ingredients for sorting its file and illustrates both the use of special codes and the use of code cards. Besides the classifications printed on the card, this file has been classified for color of the com-

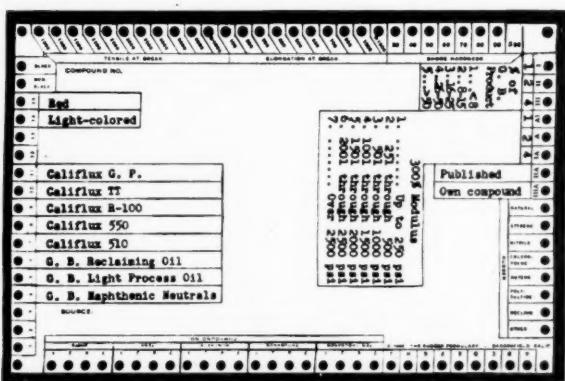


Fig. 5. Code Card of Compounding Ingredient Supplier Illustrating the Use of Special Codes and the Code Card

Some Recent Developments in Special-Purpose Polymers¹

George W. Flanagan²

POLYMERS designed for specific service requirements are appearing on the basic raw materials market in ever-increasing variety. In learning to use these interesting materials, plastics and rubber technologists have virtually closed the gap which long existed between what were once considered two separate industries. Indeed, many of the experimental product applications outlined before this society by R. P. Kenney³ at Toronto in 1946 have become successful commercial realities.

It is interesting to note the truly amazing progress that has been made within the last two or three years. While many special-purpose polymers, or compositions containing them, have been known for a long time and have been altered but little chemically in recent years, nevertheless an important milestone has been passed in their commercial development. The initial enthusiasm aroused by new compositions of matter has in many cases subsided. Now we find that attention is being paid to the physical form in which these new materials exist and to the effect of the chemical auxiliaries which make these forms possible.

Several polymeric materials developed by B. F. Goodrich Chemical Co. successfully applied to meet specific service requirements are being discussed in this paper. They all have interesting histories. In the course of their development there have been many flashes of boundless enthusiasm. In some cases these have been followed by rude awakening. The essential point is, however, that by observation and experiment the shortcomings have been recognized and corrected, or modifications have been made that have resulted in new polymeric building blocks for industry.

Polyacrylic Rubbers

One of the first polymers with special-purpose possibilities to achieve commercial acceptance was polyacrylic ester. This material is known today as Hycar PA. It is a saturated rubber-like elastomer having thermoplastic properties.

Shortly after compounding studies were initiated on Hycar PA it was discovered that despite its thermoplastic character it could be cured.⁴ Mild alkalies, and more specifically sodium metasilicate pentahydrate, were found to be effective curing agents. The actual mechanism of cure is not fully understood to this day.

It was observed that cured polyacrylic ester had unusual heat resistance for a carbon chain type of polymer. Coupled with excellent resistance to oils, greases,

and chemicals, this property opened up the possibility of applications in a field that could not be served adequately by any other known specialty rubber. Today cured polyacrylic ester is recognized by many as a "bridge" material between the fundamentally different special-purpose rubbers and the organo-silicon compounds.

The development of Lactoprene EV⁵ by the Eastern Regional Research Laboratories was contemporaneous with that of Hycar PA. It is similar to Hycar PA, but includes a halogen containing comonomer. Goodrich Chemical's Hycar PA 21 stems from this work of the Eastern Regional Research Laboratory.

Acrylic elastomers that contain a small amount of chlorine, or other halogen, respond to a different kind of cure. Sulfur and amines can be used rather than water soluble alkalies. The use of mild alkalies, and more specifically sodium metasilicate pentahydrate, is not too convenient. They must be added on the mixing mill either as water solutions, or must first be melted in their own water of hydration. Since such additives are water soluble, the resulting compounds are somewhat water sensitive.

The halogen containing copolymers have some other features worthy of consideration. These may be listed as follows: (1) better all-around milling behavior; (2) less tendency to scorch on the mill; (3) better moldability because of improved flow and reduced likelihood of delamination; and (4) vulcanizes several times more water resistant.

The halogen modified polymers cure at a somewhat slower rate. They also require reinforcing pigments to yield compounds with physical properties equivalent to the simple polyacrylic ester. These disadvantages, however, are more than outweighed by the better processing and performance characteristics.

Table 1 shows the formulation and properties of a typical Hycar PA compound suitable for calendering or extrusion. In this type of recipe it is advantageous to use ingredients with a fairly high pH in order to obtain complete cure. The compound has a low modulus. It also has a very high permanent set. For those applications where good set is required, the high value can be reduced four or fivefold by conditioning the cured article in an oven at 300° F. for about three days, or at temperatures up to 350° F. for correspondingly shorter periods.

TABLE 1. CALENDERING AND EXTRUSION COMPOUND

HYCAR PA		Parts		
Hycar PA	100			
EPC Black (WYEX)	45			
Wool Grease	5			
Hydrated Lime	4			
Sodium Metasilicate—5H ₂ O	10			
Properties				
Minutes of Cure at 310° F				
Tensile, p.s.i.	15	30	45	60
Elongation, %	1400	1650	1950	1950
Elongation, %	725	800	750	725
Modulus at 300% Elongation	550	600	700	850
Hardness—Duro A	58	62	62	66
Gravity				1.31
Compression Set 22 hrs. @ 158° F.				70
Compression Set 70 hrs. @ 212° F.				96
Demattia flex, no crack growth @ 5,200,000				

A compound based on Hycar PA 21 is shown in Table 2. This recipe and similar ones have aroused great interest in applications for "O" rings and other gasket applications. It can be seen that Hycar PA 21 in a comparable recipe produces a stock with a much higher modulus for a given hardness. Of particular interest is the fact that the sulfur does not act as a curing agent

¹ Presented before Rubber Division, C.I.C., Hamilton, Ont., Canada, June 10, 1949.

² B. F. Goodrich Chemical Co., Cleveland 15, O.

³ "Integration of the Plastics and Rubber Industries," India RUBBER WORLD, Aug., 1946, p. 682.

⁴ United States patent Nos. 2,411,899 and 2,412,475-476, S. T. Semegen, assigned to The B. F. Goodrich Co.

⁵ Mast, Rehberg, Dietz, Fisher, *Ind. Eng. Chem.*, 36, 1022 (1944); Mast, Dietz, Fisher, *India RUBBER WORLD*, Nov., 1945, p. 223; June, 1947, p. 355.

Mast, Fisher, *Ind.*, Feb., 1949, p. 596; Mar., 1949, p. 727.

so much as it does a cure modifier. By its presence it greatly improves the aging properties of the compound.

TABLE 2. HEAT RESISTANT MOLDING STOCK
HYCAR PA 21

	Parts
Hycar PA 21	100
Phiblack A	50
Stearic acid	1
Sulfur	2
Trimene base	2
Properties	
Cure—0 minutes at 298° F.	
Tensile, p.s.i.	After 3 Days in Air
Elongation, %	Oven at 300° F.
Modulus at 200% elongation	1925 2000 330 235 1350 1780
Hardness—Duro A	66 73

Although there are noticeable differences in behavior between the two polymers, as shown in Table 1 and 2, there are valuable properties common to both:⁶ (1) heat resistance intermediate between the best conventional rubbers and the silicones; (2) outstanding resistance to flexural breakdown; (3) excellent resistance to ultraviolet radiation; (4) excellent ozone resistance; and (5) good resistance to gas diffusion, poorer than Butyl, but better than other rubbers.

Costwise the acrylic elastomers are today considerably more expensive than other rubbers. But in comparison to the organosilicon polymers they have a decided advantage. They also have physical properties superior to those obtained from the silicon derivatives for most applications requiring good heat resistance coupled with oil and grease resistance.

Polyacrylic rubbers have not been known as commercial materials for very long. As volume increases, prices will surely come down. At the present time the chlorine containing monomer used to make Hycar PA 21 is expensive and not readily available. When these difficulties are overcome, Hycar PA 21 will have a full opportunity to find its rightful place in the family of acrylic elastomers.

In recent months two modifications of Hycar PA and Hycar PA 21 have appeared to meet the demand for polymers of this type that could be processed in a shorter time. The new easy-processing forms permit much faster mixing cycles and also the attainment of products with better finish. These advantages have been offset to some extent with a slight decline of physical properties. Low temperature flexibility and resilience are somewhat inferior. These polymers cannot be loaded so highly if equivalent physical properties are desired. Being cross-linked they, of course, cannot be used effectively in solvent solutions. They are, nevertheless, equivalent in heat aging properties, and they also show better water resistance.

Another form of polyacrylic ester that has stimulated great interest is Hycar PA latex. As a paper saturant it has unusual merit. Because of the outstanding resistance of all acrylics to ultra-violet radiation a saturant based on this material could easily displace the rubbers currently used, once the problem of price has been solved. For this particular end-use a chlorine containing polymer is not necessary because no cure is needed.

In applications where cure is desirable, Hycar PA 21 latex is already finding markets.

Special Polymers of the Paper Industry

Producers of specialty papers are continually expanding the applications for paper fiber-elastomer combinations. There are two general methods for bringing these two materials together, impregnation of a ready-made sheet and addition of the polymeric material in latex form to the paper pulp before sheet formation. As a general

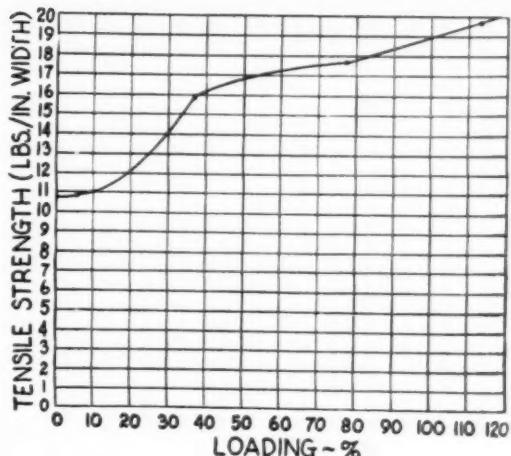


Fig. 1. Tensile Strength of Paper as % Loading with Hycar OR-25 Type of Polymer Is Increased

rule, the properties of the finished sheet are quite equivalent. However there is considerably more latitude in the variety of possible end-products with the wet, beater addition method.

Acrylonitrile-butadiene rubbers seem to have a special affinity for cellulose fibers not generally found with most other general-purpose or specialty rubbers. Six different types of water dispersed polymers used as paper impregnants were studied by R. L. Steller.⁷ The results of this investigation are shown in the following Figures 1-6 and Tables 3-4. In Table 3 the identity of the various saturants is shown.

TABLE 3. POLYMER IDENTIFICATION—PAPER IMPREGNATION TESTS

Polymer	Description
Hycar OR-25	Typical oil resistant copolymer of acrylonitrile and butadiene.
Hycar OR-15	Typical higher oil resistant copolymer of acrylonitrile and butadiene.
Hycar PA	Typical new elastomeric polymer of an acrylic acid ester.
Geon PX8	Typical modified polyvinyl chloride polymer, externally plasticized.
Geon 31X	Typical modified polyvinyl chloride polymer generally requiring no external plasticization.
Polyblend 550X20	Typical Geon polyblend latex which is a modified polyvinyl chloride resin plasticized during the original manufacturing process with a non-migrating, non-volatile Hycar nitrile type rubber.

Table 4 gives a summary of the properties obtained from the treated paper sheet. While there is no simple method of actually measuring the adhesion or affinity of high polymers to cellulose, two properties shown seem to offer a very good index: namely, the internal tear resistance and the elongation. Of the materials studied, there is no question but that the nitrile rubbers have the best affinity for the paper fibers.

In Figures 1-6, the physical properties of the treated sheet are shown as a function of polymer concentration. In all cases the polymer is Hycar Latex OR 25. It is of interest to note that the tear strength (Figure 5) and elongation (Figure 2) reach a practical maximum at a concentration of about 80% loading, based on original dry paper weight.

From a physical standpoint it appears essential that the particle size of latexes should be less than 0.2-micron to obtain good impregnation. It is also necessary that the stability of the latex system be good enough to withstand the mechanical agitation encountered in impregnation processes.

⁶ Technical report, H. P. Owen, Goodrich Chemical.

⁷ "Adhesion of Vinyl Polymers and Acrylonitrile-Butadiene Copolymers to Cellulose," Presented before the TAPPI meeting, Aug. 16, 1948, Appleton, Wis.

TABLE 4. B. F. GOODRICH CHEMICAL CO. LATTICES INCORPORATED IN PAPER BY LATEX SATURATION

Sat. Bath T.S.	C _c Loading	Tensile #/In. Width	Elongation %	Burst P.S.I.	Fold M.I.T.	Int. Tear Grams	Wet Tensile #/In. Width	Caliper Inches	Basis Weight
Hycar OR-25	9.9	37.0	15.9	7.7	28.3	112	298	4.6	
Hycar OR-15	10.0	40.7	18.6	7.7	(44.8)	434	290	5.6	
Hycar PA	10.0	38.7	20.6	3.8	29.2	533	281	1.2	
Geon PX-8	12.6	38.1	26.2	3.5	39.2	459	190	8.9	
Geon 31X	12.7	38.0	39.5	2.9	58.1	892	228	5.2	
Polyblend 550X20	10.0	37.2	24.7	2.3	26.6	173	224	2.4	
Unsat. Paper Wrenn No. 9	0	10.7	1.3	7.0	5.4	96	0.72	0.01	*31
Hycar OR-25	10.0	48.7	10.0	20.1	46.3	62	345	0.013	*40
Unsat. Paper Wrenn No. 3	0	5.5	1.5	8.1	1.4	96			

*Ream Size (19X24-500)

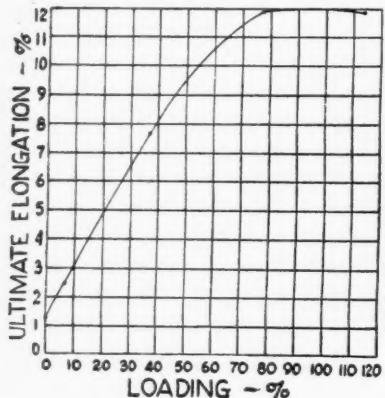


Fig. 2. Ultimate Elongation of Paper as % Loading with Hycar OR-25 Type of Polymer Loading is Increased

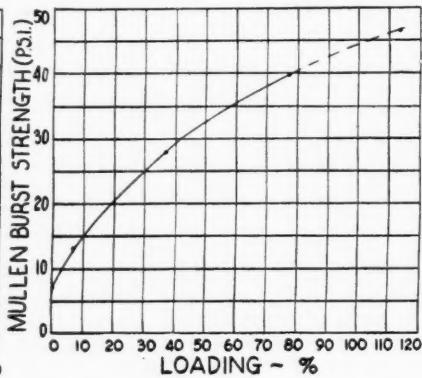


Fig. 3. Mullen Burst Strength of Paper as % Loading with Hycar OR-25 Type of Polymer Loading is Increased

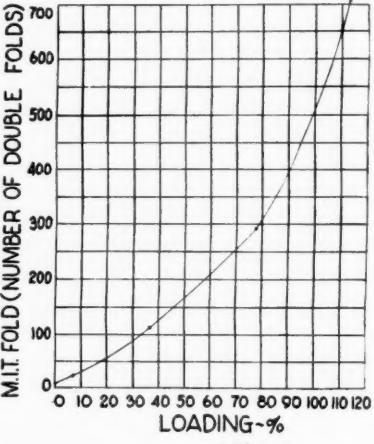
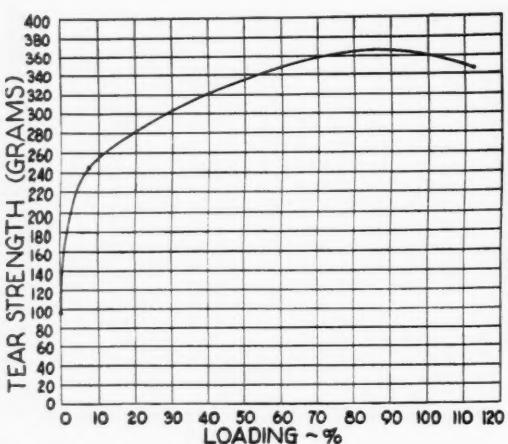
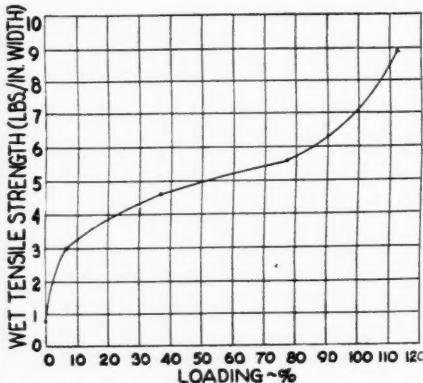
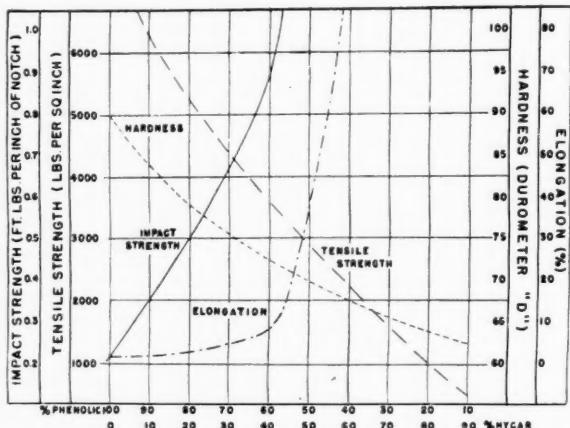
Fig. 4. M.I.T. Fold of Paper as % Loading with Hycar OR-25 Type of Polymer Loading is Increased
(Above)

Fig. 5. Tear Strength of Paper as % Loading with Hycar OR-25 Type of Polymer Loading is Increased

Fig. 6. Wet Tensile Strength of Paper as % Loading with Hycar OR-25 Type of Polymer Loading is Increased
(Left)

nitrile rubbers make ideal saturants for sheets to be subsequently coated or printed with vinyl compositions.

Recently the technology of paper treatments has been

expanded by studies involving mixtures of nitrile rubbers and water dispersed phenolics as paper impregnants. The work has not progressed to the point where data can be shown. It has been found, nevertheless, that these mixtures permit the achievement of harder papers with good physical properties and good chemical resistance. Papers impregnated with mixtures of this kind must be cured to obtain optimum physical properties.

Blends of Plastics and Rubbers

For some years it has been common practice to use phenolic resins as an additive to acrylonitrile rubbers to achieve hardness and toughness and to reduce the time of cure of compositions designed for hard rubber applications. In practically all of these cases the major polymeric component is always the rubber itself. More recently, the concept of such mixtures has been considerably broadened by using nitrile rubber as an additive to phenolic. Two materials of this type have already appeared on the market, and more are in an advanced stage of development.

Nitrile rubbers are plasticizers for phenolic resins and make possible the manufacture of molding powders with very good impact properties. This property is of special importance for those applications where a perfectly homogeneous molded material is desired. The conventional impact grade phenolics derive their properties from the inclusion of fibrous fillers.

Figure 7 shows some data presented before the Connecticut Section, of SPE.⁵ Note the extremely wide variation in properties as the formulation changes from soft to hard. In mixtures of this kind the compatibility of the nitrile rubber varies somewhat, depending upon the type of phenolic resin used. Durez resin 12687 is unusual in that it is compatible with the rubber in all proportions.

Phenolic resin technology from the standpoint of the plastics industry is an old material. It has, therefore, formulating and manufacturing techniques that have become traditional. This fact explains why phenolic-nitrile rubber molding powders were so slow in attaining commercial significance. The reason is simply that rubbers in their usual slab form could not be mixed conveniently with phenolic resins in conventional or established equipment.

Here was a need of a special-purpose polymer. The problem was solved by bringing out nitrile rubbers in the form of powders. Once this work was accomplished, the development of impact-grade phenolic powders based on nitrile rubber plasticizers proceeded without pause.

The first powdered rubbers were not without their disadvantages. Although the mixing problem no longer was an obstacle, it was soon discovered that a deficiency existed in the water resistance and mold staining characteristics of these new molding compositions. The shortcomings have been recognized, and the corrective measures are already well nigh completed by the use of better dispersing agents during rubber polymerization and by improved compounding techniques.

The properties of two commercial grades of impact phenolic molding powders containing nitrile rubbers are shown in Table 5. Actual compositions have not been disclosed. From these values it can be seen that very respectable impact resistance together with good strength properties has been achieved.

TABLE 5. PROPERTIES OF COMMERCIAL MOLDING POWDERS (USING NITRILE RUBBERS)

	G. E.	Durez
12446	13348	
IZOD impact ft. lbs. in. of notch.....	0.60	0.50
Tensile strength, p.s.i.	4500	6500
Flexual strength, p.s.i.	7000	11000
Rockwell hardness M scale.....	30	55
Water absorption.....	1.31	0.6
Apparent density.....	10	35

Another commercial application based on polymeric plasticizers, of interest to those who package food, is the use of a special type of vinyl resin plasticized with a special-purpose nitrile rubber as an oleo wrap. The combination is non-toxic and has received the approval of the Meat Inspection Division, United States Department of Agriculture.

A ruling by the M.I.D. several months ago made ester plasticized vinyl resins unusable for the packaging of meat or meat derivatives. Fortunately for the packaging industry, Geon Polyblend had already been developed. In this particular case it filled a void because it contains no ester-type plasticizers that can migrate into the food product.

The feature of non-migration has also been taken advantage of in other industries. Shoes made from nitrile-rubber plasticized vinyl resins have now been made by cementation methods because adhering constructions can be made that will not deteriorate owing to diffusion of plasticizers. Incidentally, the same shoes are held together with a cement based upon a mixture of nitrile rubber and phenolic resin.

Summary and Conclusion

The era of special-purpose polymers is now upon us and is already being taken for granted. Substantial progress has been made in the development of acrylic elastomers which have unusual heat resistance for carbon bonded molecules. Special-purpose nitrile rubbers are now providing new forms of economical paper-based replacements for products formerly dominated by leather and various natural oils. These same rubbers have found new utility as plasticizers for phenolic and vinyl polymers. It is entirely reasonable to expect an ever-widening horizon of special materials that will permit the enterprising technologist to bring about additional improvements in existing products as well as a host of new products which will challenge the old for a place in the sun.

New Adhesive Tapes by Bauer & Black

TWO new electrical adhesive tapes of claimed superior performance have been announced by Bauer & Black, Industrial Adhesive Tape Department, Chicago, Ill. The first, #163 electrical adhesive tape, is said to out-perform ASTM friction tape in more than eight ways, having a higher dielectric strength, 2,000 volts; being a better moisture barrier; being thinner, but having equal tensile strength; having greater tack; being cleaner; unwinding more easily; being non-fraying; and sticking firmly to any clean, dry surface. The new tape, it is said, exceeds ASTM standards in all these specifications.

The second tape, Polyken #822, is a polyethylene plastic-backed electric adhesive tape having a dielectric strength over 10,000 volts and excellent high-frequency performance. The new tape has the insulation and electrical characteristics of polyethylene and is claimed to be 10 times more resistant to moisture than vinyl tapes. Polyken is 0.009-inch thick, to conform closely to contours and to reduce bulk, and has a tensile strength of 22 pounds per inch of width. It is recommended for use in place of the combination of splicing tapes or compounds and friction tape for high-frequency applications.

⁵"Blends of Nitrile Rubber and Phenolic Resins," Presented before Connecticut Section, SPE, by R. C. Bascom, Jan. 14, 1949, Bridgeport, Conn.

EDITORIALS

Costs, Prices, and Profits — 1948 vs. 1949

JUST one year ago, in August, 1948, the subject of "Costs, Prices, and Profits" was discussed in this column with special reference to the price increases for rubber products which had been made necessary by the "third round" of wage increases granted organized labor in the rubber industry at about that time. It was pointed out that although sales for the first quarter of 1948 were only slightly less than for a comparable period in 1947 and production continued at a high level, the future of the rubber industry would be brighter if the objectives of both labor and management in the industry were in the direction of lower costs and lower prices instead of higher costs and higher prices.

The rubber industry is again faced with a demand of the United Rubber Workers of America, CIO, this time for a "fourth round" of wage increases, and present-day business conditions would seem to make the granting of further wage increases particularly undesirable from a management viewpoint. It is apparent that the country is entering a period of intense competition, and recent price cuts in tires and tubes and other rubber products are an indication of attempts to maintain sales and production volume, even if at the expense of lower gross income.

Although the industry is still operating at a production level about 50% higher than prewar, as evidenced by the postwar annual new rubber consumption of 900,000 to 1,000,000 tons, as compared with 700,000 tons in the late 1930's, mid-year financial reports of rubber industry firms showed that sales income was down as much as 10% and profits 19 to 42% lower than for the same period last year. It is not hard to see why management takes a dim view of further direct or indirect increases in labor costs at this time.

Unfortunately, however, this problem of increased labor costs is not to be settled between management and labor in the rubber industry, or management and labor alone in any manufacturing industry. At the insistence of the President, the merits of the demands of the workers in the steel industry for a "fourth round" of wage increases is to be decided by a special governmental fact-finding board, and this action brings a third and most influential participant into the dispute. Despite some allegations to the contrary, the recommendations of the fact-finding board for the steel industry will be used by organized labor in all manufacturing industries as a pattern for shaping their individual wage increase demands.

Increased productivity and greater sales volume were mentioned a year ago as about the best means for balancing out the increase in unit costs due to higher labor, transportation, or material costs. Increases in worker productivity are still likely to be of relatively small de-

gree. Greater sales volume may now be even more difficult to attain, particularly with established lines of products, in view of the near balance between supply and demand and the inability to make further price reductions in face of probable rising costs.

New and improved products and greater emphasis on the research and development efforts necessary to make such products possible seem to be one of the most promising means the rubber and associated industries have for bolstering sagging sales volume and profits. These efforts will, of necessity, have to extend all the way back to work on raw materials, compounding ingredients, and manufacturing processes and will also have to include new techniques in the fields of distribution and sales promotion. Some evidence of the results of a considerable amount of work in these directions is already apparent and will probably be intensified.

Whether the major volume of business in the industry in the future is with established or new products, we still believe our observation of a year ago represents sound business philosophy and should not be abandoned. Industrial progress in the United States has been outstanding because it is based on a policy of each manufacturer striving to provide consumers with increasingly better values at lower and lower prices than those of his competitors.

Continued progress of this type will be retarded if cost increases not under the control of industry management must be absorbed every year or so.

Progress in Rubber—Natural

MUCH has been written on the subject of "Progress in Rubber" over the course of the past several months and even years, but a great deal of the more recent writings have dealt mostly with synthetic rubber. Now it seems that progress with respect to natural rubber, both technological and economic, is about to be made soon at an accelerated rate.

In the economic field, according to the latest reports, the political situation in Indonesia is now nearer to solution than at any time since the late war. Studies of the rubber plantation industry by P. T. Bauer, published in the July and August issues of India RUBBER WORLD, pointed out that the potential production capacity of that area of the Far East, with special reference to the smallholder, had never actually been realized. A greater volume of natural rubber at a reasonable price may therefore be expected during the next several years.

The grading and the testing of crude natural rubber are receiving an increasing amount of attention. The British Rubber Producers' Research Association is presenting a paper on this subject at the September meeting of the Rubber Division, A. C. S., and the ASTM at its last meeting in June established a new subcommittee of Committee D-11 to develop technical specifications for crude natural rubber.

Obviously the rubber goods manufacturing industry should benefit from such progress, when achieved.

DEPARTMENT OF PLASTICS TECHNOLOGY

Low-Pressure Molding Phenolics¹

Edward F. Borro²

LOW-PRESSURE molding phenolics should not be confused with low-pressure moldings of various impregnated laminates. We are referring strictly to phenolic molding compounds which are molded under heat and pressure, but at considerably lower molding pressures than conventional phenolic materials.

Low-pressure materials are not new to the plastics industry since soft materials have been made in various forms for many years. These materials were used mainly in intricate parts, particularly to preserve delicate mold details or insert retaining pins. The cure and the appearance of these materials were generally inferior to conventional flowing types.

In the early days of the industry plastics were thought to be adaptable only to small molded parts. As the industry grew, the demand for larger molded parts grew with it. During the war years little effort was exerted to produce a satisfactory low-pressure molding phenolic as long as the industry could meet the demand for phenolic parts with the limits of existing equipment.

Within the last year the demand for large molded parts has been increasing far beyond the availability of equipment. This state of affairs was a green light for the Durez laboratories to produce a low-pressure molding material which might be the solution to this problem. Durez 13527 general-purpose phenolic material was produced; it requires less than one-third of the normal molding pressure generally used for average soft grade phenolics. The properties of this material are shown in Table 1.

TABLE 1. PROPERTIES OF DUREZ 13527

Powder Properties:	
Bulk factor	2.3
Apparent density	61
Form of material	Granular
Processing qualities	Good
Plasticity	20+ (extra soft)
Molded Properties:	
Specific gravity	1.44
Hardness, Rockwell "M"	113
Ash, %	19
Molded shrinkage, in/in	0.012
Water absorption, %	0.4 max.
Flexural strength, p.s.i.	13,000 min.*
Impact strength, ft. lbs/in.	0.26 min.*
Tensile strength, p.s.i.	8,000 min.*
Compressive strength, p.s.i.	30,000 min.*
Distortion under heat, °F.	300 min.
Dielectric strength, volts/mil (short time method)	325*
Power factor, 60 cycles	0.12*
Dielectric constant, 60 cycles	6.5*

* Specimen conditioned 48 hours at 50° C.

¹ Presented before annual conference, Society of the Plastics Industry, Inc., Chicago, Ill., May 27, 1949.

² Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y.

Compression Molding Pressures

Because of the many variables in equipment and mold design, we have always recommended for conventional phenolic material in "as is" condition a compression molding pressure of 3,000 p.s.i. on the projected land area up to one inch of depth, and 700 pounds for each additional inch of depth. Efficient high-frequency preheating, however, reduces this required pressure to 1,000 p.s.i. on the projected land area and 250 pounds for each additional inch of depth. These pressure recommendations are based on a fast press travel speed of approximately one inch per second.

Since the flow characteristics of thermosetting molding materials are more or less changing continually, particularly in slow-closing presses, previous tests and actual molding experience indicate that the pressure allowed for each inch of conventional phenolic molding material should be progressive, as indicated in Table 2. For the sake of simplicity it is satisfactory to use an average figure of 250 p. s. i. for each additional inch of depth.

TABLE 2. COMPARISON OF COMPRESSION MOLDING PRESSURES

	Pressure per Inch	
	Conventional Phenolic	Low Pressure Phenolic
First four inches of depth	100	35
Second four inches of depth	200	70
Third four inches of depth	300	105
Fourth four inches of depth	400	140

Low-pressure molding phenolic material preheated by high-frequency methods requires 350 p.s.i. on the projected mold area, and the pressure allowed for each inch of depth should be as indicated in Table 2. As a comparison, we can mold one square inch area of 16-inch depth from conventional phenolic at 5,000 p.s.i. and from the low pressure material at 1,750 p.s.i.

Low-pressure molding materials are not restricted to molded parts of any particular shape or size. They perform equally well on small and large parts, thick and thin sections, and simple and intricate shapes. These materials have exceptional ability to retain their shape upon ejection from the mold because of an inherent rigidity not common in most soft materials.

As an example of compression molding with Durez 13527, Figure 1 shows a telephone base molded with high frequency preheated preforms, having a pressure on the molded area of 500 p.s.i., and cured for 2½ minutes. Figure 2 shows various camera parts which were compression molded using high-frequency preheated preforms. The left-hand part was cured for 60 seconds, using a pressure of 240 p.s.i. on the mold land area. The camera back shown in the center was cured for 55 seconds with a pressure of 200 p.s.i. on the mold land area. Other typical applications, made with high-frequency preheated preforms, include a record player case cured for 55 seconds

at 435 p.s.i., and a vacuum cleaner housing cured for 45 seconds at 500 p.s.i. pressure.

It will be noted that the preceding illustrative parts show considerable variations in molding pressures. Since these parts were made in existing molds which were constructed for conventional phenolic materials in accumulator-operated presses having low and high-pressure systems, there were no means for obtaining the exact required pressure in each case. The high pressure system was eliminated, and the presses operated on the low-pressure system only. The curing times for these parts were the same as used on conventional phenolics, but in many instances it is possible to reduce the curing time when the low-pressure material is used.

Mold design and construction are the same for low-pressure molding as for conventional materials. However, since the low-pressure materials reach a point of extreme fluidity during the flowing action, the flash points or the fit between the force plug and the cavity must be tighter in order to retain sufficient back pressure on the material, and thereby obtain parts having lustrous surfaces and superior properties. Clearances of 0.003-0.005-inch all around are sufficient to obtain such back pressure.

A slow press-closing device is recommended for use with low-pressure phenolic, particularly on fast action presses. This device will prevent the material from escaping or splashing and will assist in building up back pressure. Press travel should be fast, up to 1/4 or 1/2 inch before the mold closes and then slowed down so that it will require from three to five seconds to close. Even at extremely low pressures, as in the case of the camera back (Figure 2, center) molded at 200 p.s.i., the material flashed out without slowing down the momentum of the press travel. Slower action during the final closing of the press, in conjunction with low pressure, gives a minimum of turbulence and friction during the flowing action, resulting in savings on mold maintenance, surface polishing, and greater production economy.

Molding Equipment

There is no question as to the saving in the initial equipment investment for low pressure molding phenolics. The actual difference is between a 900-ton press for the conventional material, as against a 300-ton press for the low-pressure material. Of course this statement does not mean that the press investment will be only one-third since it will be necessary to have greater lateral dimensions as well as longer stroke and greater daylight openings in order to accommodate large molded parts on smaller tonnage presses. The cost of the equipment for low-pressure molding will be approximately 30% that for conventional materials, according to an estimate received from a press company.

Transfer Molding

Low-pressure molding materials offer many advantages in pot-type transfer mold-

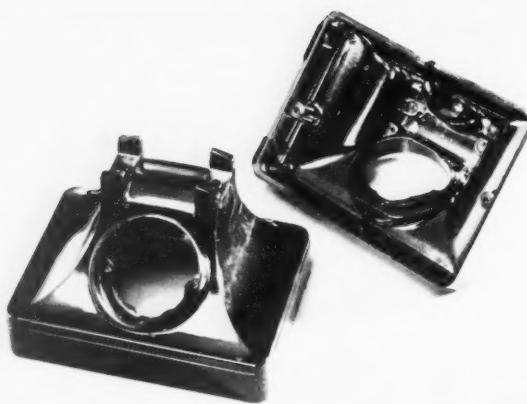


Fig. 1. Telephone Base Compression Molded from Low-Pressure Phenolic

ing, particularly when the design necessitates small diameter, long sprues, and long runners. The molding pressure required for high-frequency preheated conventional phenolic in the pot-type transfer mold is approximately 12,000 p.s.i. Since we are depending entirely on the pot area to keep the mold closed without flashing, the largest possible area which can be molded in a 200-ton press, allowing a safety factor of approximately 15%, is 28 square inches. The low-pressure materials will transfer mold at 4,000 p.s.i., which point means that an area of 84 square inches can be molded. At this pressure the transfer time will be approximately five seconds for the most difficult sprues and runners.

The right-hand part in Figure 2 illustrates a camera front that was transfer molded with high-frequency preheated preforms, using a pot pressure of 4,500 p.s.i. and cured for 60 seconds. Other typical parts made by transfer molding with high-frequency preheated preforms are a coffee maker handle molded at 5,000 p.s.i. with a three-second transfer time and cured for 50 seconds, and an electric iron handle molded at 6,800 p.s.i. with a three-second transfer time and cured for 50 seconds.

Curing time for low-pressure materials in most instances is shorter than for conventional materials in transfer molding, particularly when the timer is energized at the beginning of the cycle. Some time is gained in this manner because the transfer time is shorter. We are not concerned, however, about where the time is gained so long as we are able to achieve a faster cycle.

Transfer-type mold construction for the low-pressure materials is the same as for conventional materials, except that a minimum pot clamping safety factor of 15% or, if possible, 25% is used. Because of the extreme fluidity of the low-pressure material, the mold will flash more readily. Mold surfaces must be even and parallel, and all surfaces must be relieved for approximately 1/16-inch depth beyond $\frac{1}{4}$ -inch of land immediately surrounding the cavity and runners. Adequate air vents must be provided so that the air will clear out of the mold in the comparatively short transfer time.

Plunger Molding

For conventional materials a pressure of 8,000 p.s.i. is recommended for plunger molding. This does not mean, however, that lower pressures cannot or are not being used. When a material manufacturer recommends a molding pressure for a



Fig. 3. Two-Piece Handles Plunger Molded from Low-Pressure Phenolic

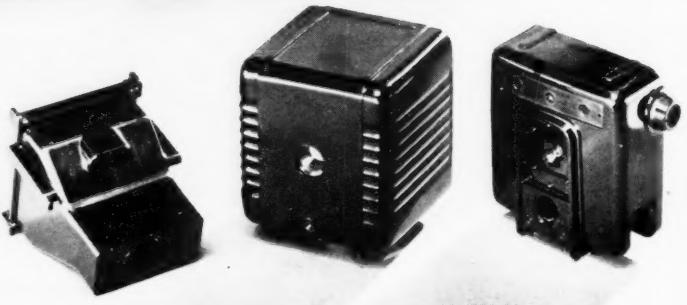


Fig. 2. Camera Parts Molded from Low-Pressure Phenolic by Compression and Transfer Methods

specific material, he very often does not have complete information regarding volume of material, length and size of runners, location and size of gate, the type of piece to be molded, and other pertinent information. He naturally recommends the pressure which will be most efficient under average conditions.

In plunger molding the molding area is controlled by the available clamping pressure. If general-purpose material is being used at 8,000 p.s.i. pressure, the maximum safe area which can be molded in a 200-ton press would be, approximately 45 square inches. Since the low-pressure molding phenolic will successfully plunger mold at 1,500 p.s.i., an area five times as large can be molded in the same equipment. Using smaller equipment for low-pressure materials being plunger molded is advantageous in many respects, including lower operating overhead, faster operating cycle, smaller and more compact press unit, less mold wear particularly in runners and gates, lower mold maintenance, and prolonged mold surface finish.

Figure 3 illustrates a two-piece handle that was plunger molded from high-frequency preheated preforms, using a plunger pressure of 1,600 p.s.i., plunger time of six seconds, and curing time of 30 seconds. In another application an electrical terminal was plunger molded from preheated preforms using a plunger pressure of 1,650 p.s.i., plunger time of eight seconds, and curing time of 50 seconds.

In all of the examples mentioned a mold temperature of between 320 and 330° F. was used. It has been found that mold temperatures as high as 370° F., or even higher, will give satisfactory results and considerably reduce curing time. For such higher temperatures, the molding pressures

should be approximately 25% higher than those given for each application, whether compression, transfer, or plunger molded.

The mold design for plunger molding low-pressure materials is the same as for conventional phenolics, except that the mold surface must be even and parallel and the land should be cut away, as stated in the transfer molding recommendations.

Summary and Conclusions

The surface appearance of the low-pressure materials in most instances is superior to that of the conventional types, and physical properties are the same except for flexural strength which is higher.

Advantages of low-pressure molding materials lie not only in savings on press equipment and prolonged mold finish, but also in the possibilities of opening up new mold-making techniques. Experiments will be conducted evaluating the feasibility and life duration of molds constructed from Kirksite, aluminum, beryllium copper, and other alloys. At the low pressures involved it is almost possible to take a drawn metal shell and successfully mold within it.

Widespread use in television cabinets is expected for the low-pressure phenolics. If cheaper molds can be constructed, these materials should also open up new fields, particularly in air conditioning, office equipment, furniture manufacture, and burial caskets.

The low-pressure phenolic materials are available in black and brown colors. Mottle-color materials are also available which will mold at 25% higher pressure than the standard low-pressure materials, but this higher pressure is still approximately 50% of the pressure required for conventional materials.

New Plastic Laminate

TENSILITE 300, a new high-pressure plastic laminate which is said to possess definite advantages over conventional laminates for certain electrical insulation applications, is being marketed by the plastics division of J. P. Lewis Co., Beaver Falls, N. Y. The new material is the result of a manufacturing technique in which a new type of virgin pulp paper is combined with Hycar rubber, phenolic resin, and other compounding ingredients to form a low-cost plastic sheet comparable to normal electrical grades.

The presence of Hycar, made by B. F. Goodrich Chemical Co., improves practically all strength properties and also gives increased moisture resistance and better electrical properties as compared to a laminate which does not contain a nitrile rubber ingredient. The presence of Hycar also makes the sheet very flexible, eliminating cracking or tearing during punching operations. Better retention of the cellulose fiber and the resins combined in the laminate is also attained through the use of Hycar.

Tensilite 300 differs from conventional high-pressure laminates in lower heat resistance, bonding strength, and cost. Tensilite 300 is much stronger lengthwise (15,000 p.s.i. tensile) than crosswise (7,500 p.s.i. tensile), and its flexural strength lengthwise is 22,000 p.s.i. as against 17,000 p.s.i. crosswise. Other physical properties are: moisture absorption, 1.5% in 24 hours at 25° C.; dielectric strength, 600 volts per mil (short time method); specific gravity, 1.35; compressive strength, 32,000 p.s.i.; and power factor, 0.045-0.050 at one million cycles.

The new laminate has been used in many electrical insulations and mechanical applications and in many places may be used as a replacement for vulcanized fiber. Tensilite 300 is used primarily as an insulation material in applications where resistance to high temperatures is not required, as in switch parts, insulating washers, radio parts, etc. It may also be used for furniture trim, wall paneling, and other general construction applications.

Koro-seal Glazing Strips

FLEXIBLE Koro-seal glazing strips for metal windows of both the fixed and storm types have been announced by The B. F. Goodrich Co., Akron, O. The strips are extruded to customers' specifications from a special stock found suitable for use as gasketing in an all-metal house. In comparative tests with other glazing strip materials, the Koro-seal compound withstood without visible change 1,900 hours in an Atlas Fadometer and 2,100 hours in an Atlas Weatherometer. The strip is made in blue-gray color; does not support combustion; has a durometer hardness of 70 ± 5 at 70° F.; is resistant to oils and greases; and has a temperature range of from 0-150° F. if flexing is required, or to any degree of low temperature if the strip is fixed. In use, it is recommended that the strip be held in place by mechanical means embodied in either the design of the window or that of the strip.

Dyphos—Vinyl Stabilizer

DYPHOS, a new stabilizer for vinyl-type plastics, has been developed by National Lead Co., New York, N. Y. Laboratory and outdoor exposure tests are said to show that the useful life of Dyphos-stabilized plastics is at least twice that of similar compounds stabilized by other means. The dibasic lead salt of phosphorous acid, Dyphos has unusually high heat and light stability coupled with excellent electrical properties, it is claimed. Flexibility, color retention, and other desirable properties of plastic compounds containing Dyphos are maintained over long periods. Unlike most stabilizers of its type, Dyphos does not change color in use, and both the stabilizer and its breakdown products are insoluble in water or organic solvents, an important feature in many of its applications.

Laminac Price Reduction

A PRICE reduction on its Laminac polyester resins has been announced by the plastics department of American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. The reduction covers seven different products in the Laminac series and ranges from 1 $\frac{1}{2}$ -3¢ a pound, depending on the product and the quantity purchased. Prior to this change the lowest prices were based on carload lots of 60 drums or more, but the minimum quantity to obtain lowest prices has now been reduced to 40 drums. At this quantity most Laminac resins are now selling for 36.5-38.5¢ per pound.

Melamine Dinnerware Promotion

In order to make Melmac melamine plastic dinnerware available to the general public, the plastics department of American Cyanamid has launched a comprehensive advertising and sales promotion program designed to expand consumer markets. Melmac dinnerware has been thor-

(Continued on page 718)

Punched Cards

(Continued from page 701)

pound, for modulus at 300% elongation, and for the type and amount of this, manufacturer's own products used in the compound. Hole 14 or 15 is notched if the compound is light-colored or red, respectively. Another group of holes on the same side has been assigned for notching when one of the company's own products is used as an ingredient. Holes I, II, and III are assigned the numbers 1, 2, and 4, for a numerical coding (a shortened version of the 1-2-4-7 system) of the amount of the company's products used, employing five different ranges of percentage of the ingredients on the rubber. Holes IV, V, and VI have also been assigned the numbers 1, 2, and 4 for numerical coding of the 300% modulus, using seven ranges of modulus.

Two holes, VII and VIII, are assigned for notching if a compound is from the company's own laboratory records, and, if so, if the compound has been published. The notch in hole VIII in this case makes it possible to code the laboratory number of the compound in the "Compound No." field, since the file may be separated

before using the "Compound No." field into private compounds and those from the literature.

Figure 6 shows a card from this file with a rubber compound from the company's own records notched for these classifications.

Summary

Marginal punched cards lend themselves excellently to cataloguing and abstracting of rubber compounds published in the literature as well as to keeping one's own records. On the basis of this conclusion an information service has been set up by the Rubber Formulary to distribute to subscribers data in the field of rubber compounding which are published, but which are in no way indexed in the literature. In this way the information is made readily available to individual rubber compounders. Expanding the file to include his own compounds provides the subscriber with an efficient tool for making data easily accessible.

The valuable suggestions of F. S. Rostler in the setting up of the coding system described in the paper is gratefully acknowledged, and appreciation is expressed for his permission to reproduce the code card used in the files of Golden Bear Oil Co.

Scientific and Technical Activities

Developments in Wire and Cable Industry

THE progress of chemical developments has given us a new rubber industry and has greatly changed all industry dependent on rubber. The impact of this development is illustrated by the fact that for the first quarter of 1949 the insulated wire industry consumed more neoprene than any other type of rubber. The United States Department of Commerce report shows that the total consumption of rubbers was at the same rate as in the first quarter of 1948, but for the first time neoprene represented the major item. Neoprene was 39% of the new rubber; GR-S, 38%; natural rubber, 22.2%. This point is interesting in view of the much higher cost of neoprene.

Neoprene has properties which recommend it for special cable, such as toughness and flame resistance which enable it to replace rubber for sheaths on portable cables and for mining cables. Neoprene has found wide usage as a replacement for lead sheaths and also for high priced cotton braids as a protective covering. The use of this special polymer for replacement of rubber, cotton, and lead in special and standard constructions, such as weatherproof, non-metallic-sheathed cable for barn wiring and in mining cable as well as building wire, represents an important departure from standard custom, and we believe it is permanent because it is both technically and economically sound.

Another development which represents technological progress and represents a trend which will grow is the increased use of Butyl rubber. The use of Butyl in the wire industry will show a large increase

over use in 1948.

Some processing problems still remain, and with the solution of these and the development of improved compounding ingredients for Butyl, the latter is expected to become one of the principal rubbers for wire insulation.

The industry still prefers GR-S over natural rubber; however, because of the increasing pressure for economy and the improved uniformity in the supply of natural rubber, it is doubtful if GR-S can hold its place as the principal type of rubber used for insulation during the second quarter of the year. The improvements of GR-S will not be detailed here, but the uniformity of processing and moisture resistance have established a preference for GR-S in high-quality insulations. The industry is now busily engaged in evaluating "cold rubber" for insulation and sheaths.

While competition in the industry exists among the rubbers neoprene, GR-S, "cold rubber," Butyl, natural rubber, and very active technical and economic evaluation is in progress throughout the industry, there is still a continual increase in the use of plastics, polyvinyl chloride and polyethylene. The range of usefulness of polyvinyl chloride is being extended through the development of new plasticizers. Extensive studies in methods of mixing with resultant improvement in properties and lower cost are under way. In certain fields of appliance wiring and also to very large degree in building wire polyvinyl chloride has largely replaced rubber. Because of excellent electrical characteristics polyethylene has found a wide application in the

communication field. It is also entering the power cable field in competition with high-voltage rubber. Extensive studies are under way to evaluate the use of polyethylene in this field. Installations for street lighting service have been extensively made with good results where polyethylene has replaced rubber. For power circuits it is doubtful if this polymer will find general application because of the low softening point.

Silastic has found some important applications because of the broad temperature range. Recent development of a tougher polymer and faster curing rate indicates that Silastic will find increasing use for special applications, particularly where temperatures below -50° and $+100^{\circ}$ C. are required.

With the many developments of new materials comes the need of developments of new and improved methods of evaluation. Methods of aging, evaluation of moisture resistance, measurement of corona-level on finished cables, and the development of specification standards are projects in many laboratories and engineering associations, among which are Insulated Power Cable Engineering Association, National Electrical Manufacturers Association, American Society for Testing Materials, American Institute of Electrical Engineers, American Standards Association, and many government departments. The reports of these developments will give valuable guidance to the entire rubber industry. This period is one of great activity and testing to determine the proper application of existing polymers as well as of new modifications which are being developed.

Rubber Division, A. C. S., Atlantic City September Meeting

THE Division of Rubber Chemistry, American Chemical Society, will hold its fifty-fifth meeting as a part of the meeting of the parent Society in Atlantic City, N. J., on September 21 through 23, as previously announced. The Division headquarters will be the Chalfonte-Haddon Hall, where the morning of September 21 has been set aside for registration.

H. I. Cramer, Sharples Chemicals, Inc., chairman of the Division, will preside at the technical sessions on the afternoon of September 21, the afternoon of September 22, and the morning of September 23. He will also preside at the banquet on Thursday evening, September 22, and at the business meeting on the morning of September 23, at which time the results of the letter balloting for officers for the coming year will be announced.

A luncheon meeting of the Division's 25-Year Club is scheduled for September 21. John Coe, Naugatuck Chemical Division, United States Rubber Co., is chairman of this meeting.

Lawrence K. Youse, L. H. Gilmer Division, U. S. Rubber, is chairman of the local committee on arrangements. There will be the usual entertainment program at the banquet on Thursday evening, but no speaker. The cooperative suppliers' cocktail party will not be held at this

meeting since it has been decided to hold this party at only one meeting each year.

Abstracts of papers to be presented at the technical sessions follow.

Abstracts of Papers

WEDNESDAY AFTERNOON—SEPTEMBER 21

2:10 P.M.—**Some Problems Involved in the Grading and Testing of Natural Rubber.** W. P. Fletcher, British Rubber Producers' Research Association, Welwyn Garden City, England.

The work of the BRPRA on this subject falls into two main sections, one is concerned with the properties of the raw material as such, e.g., plasticity, and the other is concerned with the properties of compounds and vulcanizates which may be prepared from it. The paper deals mainly with the latter section.

It was necessary to make an early decision upon a suitable test compound, upon the properties to be investigated, and upon the test methods to be employed. Various gum stocks, including the A.C.S. test formula, were used in the early work since such stocks were considered suitable for demonstrating clearly any important variation in the raw rubber. An important factor governing the ultimate choice of a test

compound was the sensitivity of some compound to moisture content.

As regards properties to be investigated, abrasion resistance and flex cracking were ruled out of the early work because of the inherent difficulties of such tests. The high experimental error associated with tensile strength tests and the small number of applications in which tensile strength is known to be a critical factor suggested that this measurement should not be given undue importance in the program of work. Most of the measurements were of tensile strain at a fixed time after application of a definite load, using a very simple apparatus of the same general type as that developed by the United States Bureau of Standards. This type of measurement has been shown to be subject to a lower experimental error than the conventional "modulus" test. A feature of the method used is the absence of any necessity for measuring or marking of test pieces or for any calculation to give the final result. In order to obtain maximum discrimination between rubbers, mixing and curing errors were investigated and reduced by the employment of improved techniques.

Data are given on rubbers from a number of Malayan estates, variation between and within estates being estimated.

2:40 P.M.—**Determination of the Re-**

Refractive Indices and Second-Order Transition Temperatures of Elastomers at Temperatures from 25° C. to -120° C.
Gerhard M. Brauer and Richard H. Wiley,
University of North Carolina, Chapel Hill,
N. C.

In previous papers¹ a refractometric method was described for determining the second-order transition temperatures (T_m) of polymers whose transitions occur between 75° C. and -60° C. The convenience with which the measurements can be made suggested further study to establish the utility of the method for the determination of T_m below -60° C. This paper reports (1) development of the experimental technique for the determination of refractive indices at temperatures down to -120° C. and (2) refractive index data obtained by this method for natural rubber and a number of synthetic rubbers. This development makes possible a rapid and accurate method for determination of T_m of rubber-like polymers.

Measurement of the refractive indices at temperatures below -60° C. is best accomplished by insulation of the standard Abbe refractometer. Dry air used for the cooling medium is passed through liquid air into the insulated refractometer. By careful adjustment of the air flow, temperature control of $\pm 0.5^\circ$ C. from 30 to -120° C. is obtained. Substantially lower temperatures can be obtained by passing air through a cooling coil immersed in liquid air instead of through the liquid air container, but this method has the disadvantage of poor temperature control and excessive consumption of liquid air. Refractive index readings can be made by either the transmitted light technique or the method of grazing incidence. Both methods give values for n_D and T_m which agree within ± 0.0002 in n_D and of $\pm 2^\circ$ C. in T_m .

Refractive index *vs.* temperature data show the usual change of slope which locates T_m . The observed values for T_m agree with the values obtained by other methods where data are available for comparison. A series of fractionated polyisobutylene shows little change in T_m in the range of 233,000 to 4,300 molecular weight. Removal of impurities from commercial GR-S does not produce any significant change in T_m .

3:00 P.M.—Application of Microradiography to Rubber Compounding Problems. M. J. Brock, Firestone Tire & Rubber Co., Akron, O.

The use of radiography for the purpose of determining macroinhomogeneities within materials is well known and has been used since the discovery of the penetrating power of X-rays. Less well known, however, is the use of combined radiography and microscopy under special conditions to determine in detail the micro or semi-micro structure within opaque materials.

A simple microradiographic camera is described for studying rubber specimens in both the relaxed and elongated state. This camera can be used with ordinary X-ray diffraction equipment serving as a supply for unfiltered, low-voltage X-radiation. The X-ray beam for this study was produced by a Philips Norelco X-ray diffraction unit using a copper target X-ray tube operated at 15 kilovolts and 15 to 20 milliamperes. A target-sample distance of 4.5 inches was found adequate for producing a sharp radiographic image. The radiograph is recorded on extremely fine-grain film. Eastman film having a type 348-0 spectrographic emulsion was used in this work. The radiograph of the sample is subsequently used as a microscope speci-

men, and enlargements up to 300 diameters can be obtained. The degree of magnification is limited, of course, by the resolving power of the film used.

The specimens for radiography are prepared by pressing the elastomer out into sheets of the desired thickness between layers of cellophane. For studying vulcanized samples the compounded stock is cured in a circular mold 0.012-inch thick. Specimens thicker than 0.015-inch are undesirable.

In the study of pigment dispersion, the technique is useful in estimating the degree of dispersion of loading materials and compounding ingredients. The dispersion in masterbatches, and the efficiency of various pigment coating treatments designed to improve dispersibility, can be studied.

The method has also been applied to the study of elastomer dispersions and the observation of vacua formed around various pigment particles when a vulcanized sample is elongated. From a study of such vacua it is possible to obtain information concerning the ease with which various pigment particles are wet by a particular elastomer.

A microradiographic study of flex cracking shows that cracks or surface ruptures may be caused by large particles or aggregates of small particles embedded near the specimen surface. With the use of a micro X-ray diffraction technique some of these particles have been identified as aggregated zinc oxide and carbon black "grit" particles.

A comparison of the microradiographic technique with microscopic methods shows that microradiography is superior for the study of opaque rubber compounds and is even valuable in obtaining information supplementary to microscopic data when semi-transparent specimens are being studied.

3:25 P.M.—The Ultra-Speed Tensile of Rubber and Synthetic Elastomers. D. S. Villars, U. S. Rubber, Passaic, N. J.

A high-speed stress-strain machine has been developed which is capable of recording the stress-strain curve of elastomers at elongation rates up to 270%/msec. Data are reported on two series of gum and tread stocks of *Hevea* and of the synthetic elastomers, GR-S, Hycar OR, Butyl, Perbunan, and Neoprene GN. The second (elastomer) series was also run at 150° C.

In general, stress-strain curves fall into two classes. Stocks of elastomers known to crystallize on stretching tend to show tensiles which decrease with increasing speed up to about 10%/msec, pass through a minimum, and rise more or less drastically to values 100% (or more) greater than the Scott tensile. Elastomers which do not crystallize on stretching tend to show a steady rise in tensile with increasing speed. Elongation at break curves show a maximum with crystallizing stocks and no maximum with non-crystallizing stocks.

The shape of the modulus *versus* speed curves is accounted for on the hypothesis of different types of slipping bonds with different characteristic relaxation times. The shift of curves for tread stocks with temperature allows the estimation of a heat of activation of slippage. This comes out to be of the order of three kg. cal.

3:50 P.M.—Effects of Sulfur and Accelerator Variations Upon the Physical Properties of a "Cold Rubber" Tread Stock. L. R. Sperberg, Phillips Chemical Co., Bartlesville, Okla.

The effect of sulfur and accelerator variations over a wide curative range has been investigated in two "cold rubber" (Philprene A) tread stocks reinforced with Philblack A and with channel black. The sulfur variations ranged from 0.5 to 3.0

PHR; while the accelerator (benzothiazyl sulfenamide) was varied from 0.75 to 3.0 PHR. The selection of sulfur and accelerator levels has been purposely broadened so as to cover a wide range of cure states ranging from extreme undercure to extreme overcure. Very complete physical properties have been developed, both on the original stocks and on stocks oven aged 24 hours at 212° C.

The data have been plotted in such a manner that the specific effects of changes in accelerator and sulfur levels upon the various physical properties may be determined instantly from a series of specially prepared graphs. A few three dimensional graphs plotting accelerator *versus* sulfur *versus* cure time have been prepared for some of the more pertinent properties.

A study of the isopleth (a graph showing the occurrence of any phenomenon as a function of two variables) graphs shows very strikingly the tremendous effect of accelerator dosage upon ultimate physical properties of compounds. With "cold rubber" one part of accelerator is almost equivalent to one part of sulfur in its effect upon modulus, tensile, resistance, flex life, and hardness. Mooney scorch data determined at 280 and 307° F. show that accelerator dosage has a negligible effect, but that the sulfur level has a direct effect upon the ultimate scorch time.

State of cure data, using the relaxed compression set test as the criterion for measuring this property, show rate of cure to increase with increase in the sulfur and accelerator levels up to two PHR of sulfur beyond which point sulfur activates very little.

Tensile strength is at a maximum at from 1.9 to 2.4 PHR sulfur and 1.35 to 2.0 PHR of accelerator. The sulfur level is more critical than the accelerator level, particularly after oven aging.

One of the trends observed in this study was unexpected and contrary to the generally accepted ideas of rubber compounding. Laboratory abrasion data (original and aged, unextracted and ETA extracted) showed the abrasion resistance to undergo no degradation and in several cases actually to improve slightly as sulfur and accelerator levels were lowered (while still maintaining essentially equal state of cure) although all the other properties showed evidence of so-called "accelerator starvation." This trend is wholly contrary to generally accepted ideas of the effect of sulfur and accelerator dosage upon abrasion resistance. In order to determine if this effect was real, experimental tires were built (9.00-20) wherein the accelerator was lowered from 1.2 to 0.9 PHR in a Philblack O reinforced compound containing 1.75 PHR of sulfur. At 50% of the non-skid tread loss, on tires which will give approximately 55,000 miles of drive wheel wear before wearing smooth, the compound containing the lower accelerator quantity is not only equivalent to, but is actually showing a small superiority approaching 10% improvement to the higher accelerator control tread. The crack growth resistance of the tires has not been impaired by the reduction in accelerator content.

Similar laboratory trends were observed in natural rubber-Philblack A and channel black systems although the extent of variance was somewhat less. Road wear results on natural rubber Philblack O tires are confirming the laboratory abrasion data in that a lowering of either sulfur and/or accelerator dosage without reducing the state of cure has resulted in no degradation in the wearing qualities of the treads.

4:20 P.M.—Improvement of Disper-

¹ *J. Polymer Sci.*, 2, 10 (1947); 3, 455, 647, 704 (1948).

sion of Benzothiazyl Disulfide in GR-S and Natural Rubber by the Use of Fusion Mixtures with Sulfur. M. C. Thordahl, Monsanto Chemical Co., Nitro, W. Va.

A series of low-melting fusion mixtures specific for benzothiazyl disulfide and sulfur has been found to improve the dispersion of this accelerator in GR-S and *Hevea* rubber stocks. Both high-melting, slightly soluble accelerator and sulfur are thus incorporated into the rubber stock in the liquid state. Preparation of fusion mixtures and methods of measuring dispersion are described. Data are shown which demonstrate the dispersing, vulcanizing, and aging properties of one of the low-melting fusion mixtures. On an equivalent weight basis with separate components the fusion products are faster in rate of cure, slightly more scorchy, and equal in aging properties. These effects are more pronounced in GR-S than in *Hevea* rubber.

THURSDAY AFTERNOON—SEPTEMBER 22

2:00 P.M.—Mooney Scorch by Varying Temperatures. A. A. Somerville and G. C. Maassen, R. T. Vanderbilt Co., New York, N. Y.

With the idea of saving time in the laboratory, tests have been made on four rubber compounds determining scorch characteristics, operating the Mooney plasto-meter at a range of temperatures from 220 to 280° F. Naturally results were obtained much more quickly at the higher temperatures. The data are shown in the form of curves on lantern slides.

2:15 P.M.—The Importance of Controlling Heat Losses in Molding Operations. R. E. Shirader and W. N. Keen, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

The time required for a mold to reach the temperature of the press following the cooling which takes place during the normal loading and unloading cycle is far greater than is usually suspected. This factor has become of increasing importance with the development of the extremely short curing cycles at high vulcanizing temperatures commonly followed in some branches of the rubber industry.

Tests were conducted on a laboratory press, and data are presented to show that the magnitude of the temperature drop varies as the temperature of the press increases from 125° C. (259° F.) to 162° C. (324° F.) and that the time for the mold to reach the platen temperature after re-loading is approximately nine minutes.

These effects can be minimized by insulating the hot mold from the apron or bench during the loading or unloading cycle. Tests were carried out using various insulating materials, and it was shown that the most practical method consists of placing the hot mold on stainless steel rods, thus providing an air gap between the mold and the apron or bench.

The practical importance of this technique is demonstrated by comparative data on both a natural rubber and a neoprene vulcanizate of the type commonly used for mechanical goods.

2:35 P.M.—Polyamine-Activated Polymerizations. G. S. Whitby and N. Wellman, University of Akron, Akron, O.

The authors have found that many amines have the ability to decompose peroxides and hydroperoxides, and that some amines, especially the polyalkylene polyamines, when added to an emulsion polymerization system in which the "catalyst" is an organic hydroperoxide, increase the vigor of polymerization at low temperatures in relatively short periods of time. Thus, for example, in a soap emul-

sion, styrene underwent 70% polymerization in one hour at 10° C. under the influence of 0.2% cumene hydroperoxide and 0.2% tetraethylenepentamine; a 70-30 butadiene-styrene mixture emulsified in a soap solution gave a 70% yield of polymer in six hours at 10° C. with the same catalyst combination, and a 58% yield in six hours at 10° C. under the influence of 0.2% cumene hydroperoxide and 0.2% triethylenetetramine. When diisopropylbenzene hydroperoxide was used in place of cumene hydroperoxide, reaction rates were still higher.

Diethylenetriamine is considerably less effective than the two polyamines just mentioned, and ethylenediamine is almost entirely lacking in activating effect. It appears that the presence in the amine molecule of both primary and secondary (or tertiary) amino groups is necessary for the activating effect. Thus, for example, N-monoalkylethylenediamines show activity; whereas syn-di-N-alkylethylenediamines do not. The tri-primary mono-tertiary amine, tri(beta-ethylamino) amine, will function as an activator. 1, 3-Bis (2'-aminoethylamine) propane has an activating effect, but is not so powerful as triethylenetetramine, from which it differs in having a trimethylene grouping in the chain in place of one of the ethylene groups.

In addition to the free polyalkylene polyamines, their condensation products with acetaldehyde and other aliphatic aldehydes and the maleamic acids formed by their addition to maleic anhydride will function as activators.

3:20 P.M.—Alfin Catalysts for Polymerizing Butadiene. A. A. Morton, Massachusetts Institute of Technology, Cambridge, Mass.

The Alfin catalyst consists of a pair of sodium salts, derived from an alcohol and an olefin. The better members of this class of reagents cause butadiene to polymerize with extreme rapidity and to very large polymers. The catalysts were discovered during an investigation of the action of butadiene with allylsodium in the presence of diisopropyl ether. The ether was cleaved with formation of sodium isopropoxide and allylsodium, a pair of salts which cause extremely rapid polymerization.

A comparison of this method of polymerization with the ordinary sodium process or with one caused by the conventional type of reactive sodium salts shows that the new reagent has unique characteristics as follows: the composition of the reagent is specific; the velocity of polymerization is exceedingly high; the intrinsic viscosity of the polymer is extremely high; the viscosity is higher the faster the polymerization; the viscosity is unaffected by the amount of reagent, but is controlled by the specific nature of the pair of sodium salts; the polymerization is mostly 1.4; butadiene polymerizes faster than styrene, and the viscosity is unaffected by the nature of the terminating agent used. The majority of these effects is not found in any other polymerizing agent.

The methods being used in the study of this catalyst are different from conventional studies in polymerization because of the unusual reactivity of sodium salts and because of the heterogeneous character of the system. For example, great attention has been given to the elimination of side reactions caused by the activity of the sodium salts, primarily as metalating agents. Attempted metalation of rubber causes the formation of gel; the more severe the condition the more the gel. Also

the composition of the catalyst is found to have a unique effect on the nature of the product, particularly on the viscosity and percentage of gel.

The explanation for the unique properties of these reagents probably lies in the peculiar nature of the sodium reagents as a class. They are insoluble aggregates of ions. The fact that the properties change, as the composition of the ionic aggregate changes permits a wide variation in the nature of the reaction which is not found in homogeneous systems.

4:05 P.M. The Biosynthesis of Isoprenoid Structures. John R. Johnson and Koert Gerzon, Cornell University, Ithaca, N. Y.

This paper is an interim report of a study of the biosynthesis of rubber being conducted at Cornell University under the sponsorship of the Office of Rubber Reserve, Reconstruction Finance Corp.

Our general objective is to determine the particular organic substances that serve as immediate precursors of the isoprene units converted by various plants into polymeric isoprenoid structures (terpenes, diterpenes, triterpenes, etc.). This information may then furnish a basis for investigation of the intimate mechanism of the natural polymerization process.

It is most probable that simple molecules of carbohydrate origin, such as acetic and pyruvic acids, are the starting materials for natural syntheses of isoprenoid structures. Pyruvic acid, the keystone of the whole scheme of biosynthesis, furnishes by enzymatic transformations a variety of reactive intermediates. Without excluding other hypotheses, the present work has been based broadly on the view that pyruvic acid and acetone (or related structures) undergo condensation to furnish a C₆ hydroxy acid, "acetone-pyruvic acid," which leads to an unsaturated C₅ alcohol or a saturated C₅ glycol that plays a significant role in isoprenoid syntheses.

The general plan has been to prepare samples of a variety of C₅ unsaturated alcohols and related glycols, C₆ hydroxy and amino acids, etc., and to study the effect of these compounds on growing tissues of two rubber bearing plants, *Cryptostegia* and Russian dandelion.

Of about 20 compounds tested, many exhibited toxic effects at concentrations of 500 parts per million or less. Two of the C₅ alcohols, 2-methyl-3-butene-2-ol ("isoprene alcohol") and the glycol, 2-methylbutane-1,3-diol, were relatively non-toxic and appeared capable of serving as sources of carbon for plant growth and for latex production. A summary of the plant growth tests and of hypotheses based on these results will be presented.

FRIDAY MORNING—SEPTEMBER 23

9:00 A.M. New Developments in Silastic. A. D. Chipman, H. F. Schmidt, G. M. Konkle, Dow Corning Corp., Midland, Mich.

Silicone rubber has been reported to possess certain desirable properties inherent in its chemical structure. The most important of these are: (1) stability at high temperatures; (2) weather resistance; (3) low temperature flexibility, and (4) resistance to lubricating oils. Silastic, the Dow Corning silicone rubber, was initially formulated into a series of stocks and pastes, all of which possess the essential properties listed.

Since the introduction of the original Silastic stocks, a number of new compounds have been developed which retain the desirable characteristics of the earlier formulations and possess some greatly improved properties. These are (1) increased

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tensile strength and elongation; (2) ability to withstand lower temperatures; (3) greatly-reduced compression set, and (4) the property of being self-extinguishing when kindling flame is removed. In general, only one of these improvements have been incorporated in a single formulation. Some new stocks, however, possess two or more of these desirable properties.

Low TEMPERATURE SILASTICS: Silastic in its early stages of development had brittle points of -70 to -90° F. , but it could not be used successfully for very long periods of time at temperatures below -65° F. To supply the military demand for a material flexible indefinitely at -70° F. , a new series of Silastic stocks was developed. These materials have brittle points in the range of -130° F. and easily withstand continuous exposure at -70° F. In addition they retain the high temperature stability characteristic of the silicone rubbers and show a somewhat lower compression set. Their other physical properties are comparable to those of the original Silastics.

COMPRESSION SET: Silicone rubbers have always possessed good resistance to compression set at elevated temperatures. The % set after 22 hours at 300° F. under 25% compression is approximately 40% for the best of the original Silastic stocks. The industrial demand for resilient materials with high resistance to permanent deformation at 300° F. and upward was met by a series of Silastics which, under similar conditions, have a compression set of 10 to 25%. The % set at 390 and 480° F. was also reduced.

FLAME RESISTANCE: All silicone rubbers possess a certain degree of flame resistance. Under most conditions, however, they will not only burn, but will support combustion. A group of Silastic stocks has recently been developed which are self-extinguishing even under drastic conditions. This material supplied the need of a rubber for use at high temperatures which will not support combustion if subjected to flame or extremely high temperatures.

SILASTIC 250: One of the major deficiencies of silicone rubbers has been their relatively low combination of tensile strength and elongation. Recently the first major improvement in both of these properties has been accomplished in Silastic 250. Although some Silastic stocks have elongation values almost equivalent to that of Silastic 250, and others have an equivalent tensile strength, none has a comparable combination of elongation and tensile strength. The efficiency of Silastic 250, expressed as the product of tensile strength times elongation, is two to six times that of any previous Silastic. Tear resistance and abrasion resistance are correspondingly improved.

Besides increased tensile strength and elongation, Silastic 250 has a brittle point in the range of -130° F. and is as serviceable at low temperatures as the series of stocks specially compounded for this purpose. It also has a high degree of heat resistance. Electrical properties are improved and are exceptionally stable over a wide temperature range.

9:20 A.M. Properties and Utilization of Polyacrylic Rubbers. H. P. Owen, B. F. Goodrich Chemical Co., Cleveland, O.

The four polyacrylic rubbers referred to in this paper are commercially available from the B. F. Goodrich Chemical Co. and are identified as Hycar PA, PA-11, PA-21, and PA-31. Hycar PA is an elastomeric polymer of an acrylic acid ester. Hycar PA-21 is a copolymer of an acrylic acid ester and a halogen-containing derivative. This copolymer (experimentally identified as Lactoprene EV) was developed by the

Eastern Regional Research Laboratories, U. S. Department of Agriculture. Hycar PA-11 and Hycar PA-31 are special forms of PA and PA-21 which are designed for easier processing. They are not recommended for cements, and their vulcanizates are somewhat less resilient.

These chemically saturated, thermoplastic polymeric materials are responsive to certain vulcanization processes which convert them from thermoplastics to thermosets or "cured" products with a possible hardness range comparable to conventional rubbers. Properties of the vulcanizates of these elastomers are described with particular reference to their usefulness in high-temperature (300 to 400° F.) service applications.

The properties discussed include the ability of these elastomers to withstand the deteriorating effects of sustained high temperatures in air and various non-aqueous immersion media; resistance to flexural breakdown, compression set, ultra-violet light, ozone, and gas-diffusion; compatibility with plasticizers and other-type rubbers; and electrical properties of specially compounded stocks.

Variations in compounding, mixing, processing, and curative systems, necessary to attain optimum properties for the individual polyacrylic rubbers, are also discussed briefly with specific usefulness of each type emphasized. Furthermore it is pointed out that polyacrylic rubbers may be processed with equipment standard to the rubber industry.

This paper suggests a number of commercial applications for polyacrylic rubbers, based on their inertness to the factors which normally cause accelerated aging and deterioration of the chemically unsaturated, conventional rubbers.

9:40 A.M.—The Vulcanization of Neoprene Type W. D. B. Forman, L. R. Mayo, R. R. Radcliffe, du Pont.

Neoprene Type W is an improved chloroprene polymer which has a much more uniform molecular weight distribution than any of the other neoprenes. Neoprene Type W contains no sulfur, thiuram disulfide, or other compounds capable of decomposing to give either free sulfur or a vulcanization accelerator. The fundamental differences between it and the other general-purpose neoprenes can be shown in a variety of ways, for example, its superior storage stability, improved processing characteristics, and favorable response to a variety of vulcanizing systems.

The work presented in this paper shows that both with respect to the curing system used and the physical properties of the resulting vulcanizate, Neoprene Type W is more like natural rubber than any of the other neoprenes. Two general methods of acceleration, (1) metallic oxide-sulfur-rubber type of organic accelerators, and (2) metallic oxide-neoprene type of accelerators, are discussed. The variety of these combinations permits a degree of flexibility not previously available in neoprene compounding, particularly since the data show that some form of organic acceleration is necessary to obtain satisfactory rates and states of cure.

Comparisons are made between Neoprene Type W vulcanizates and those of Neoprene Type GN. The outstanding improvement in compression set values as well as other specific physical properties obtainable with Neoprene Type W are discussed.

10:00 A.M.—Stopping Agents for "Cold Rubber." L. B. Wakefield and R. L. Bebb, Firestone.

In the emulsion polymerization process leading to the preparation of synthetic rubber it has been found that the physical

quality of the product reaches a maximum in a certain range short of complete conversion of monomer to polymer. For the practical isolation of the polymer at any given conversion, therefore, it has been found necessary to add a polymerization inhibitor, or short-stopping agent, to the latex at the optimum point. This agent must prevent increases in conversion during monomer recovery operations and latex storage up to the time of coagulation and drying. Since all normal emulsion systems involve the use of an oxidizing agent as the polymerization initiator, the stopping agent must decompose the remaining initiator as well as react with and destroy the polymer free radicals still existing, if further polymerization or cross-linking is to be avoided.

The early methods for evaluating stopping agents involved one of two tests. First, the experimental material could be added with the original charge, and any tendency toward inhibition could be observed. Second, the potential stopping agent could be added at the desired conversion, and an increase in conversion checked after aging the latex at an elevated temperature. The former test was discarded because certain materials could inhibit the initiation of polymerization without stopping an actively polymerizing system; the latter test was objectionable since cases were noted where Mooney plasticity increased even though the conversion remained constant.

A more thorough and searching method of evaluating stopping agents for synthetic rubber polymerization has been developed and used to demonstrate the value of several new compounds in stopping Redox systems. The technique involves heating the latex in the presence of the particular chemical being tested, with subsequent isolation and analysis of the polymer. The determination of the change in the polymer solubility, intrinsic viscosity and plasticity in addition to the presently accepted conversion test made possible the development of materials showing a high degree of stopping activity. The determination of the aged cut growth resistance of compounded and cured stocks has also been used to evaluate those stopping agents which the earlier tests had shown to be of value.

Since early work had shown that 2,4-dinitrochlorobenzene was a powerful stopping agent, but was undesirably toxic, much of the work reported herein was concerned with the preparation and testing of reaction products of this material which are expected to be equally effective, but less toxic. Of these derivatives, dinitrophenyl benzothiazyl sulfide, dinitrophenyl pyridinium chloride and dinitrobenzenethiol were found the most effective. All but the last material were tested on a pilot-plant scale, and it was shown that by the use of the first-named compound, polymers with a significantly superior aged cut growth resistance could be prepared. Toxicity tests on the pilot-plant samples are now in progress.

The results obtained from a study of other derivatives indicated that the presence of nitro groups was not alone sufficient to give stopping activity and also that oil-solubility was not essential. In some cases a heat softening of the polymer while in the latex state was observed. This was most noticeable with the combination of 2,5-di-tertiary butyl hydroquinone and sodium nitrite, by means of which a high initial gel was reduced to zero during the latex aging period of the test.

10:20 A.M.—Effect of Oxygen on Rate of Polymerization of GR-S in Various Low-Temperature Emulsion Systems. R. W. Hobson and J. D. D'Ianni, Goodyear Tire & Rubber Co., Akron.

The presence of oxygen in the GR-S polymerization system has been considered undesirable since it inhibits the polymerization, as shown by Kothoff and others. It has therefore become standard practice to reduce the oxygen content to as low a level as practicable. Recent work with Redox polymerization systems, such as the iron-cumene hydroperoxide recipe at 41° F., indicated they might be even more sensitive to the presence of oxygen than is the GR-S system, in view of the poor reproducibility of polymerization rate.

Accordingly, a systematic study was made of four different polymerization systems at 41° F., which were compared with the regular GR-S system at 110° F., to which various amounts of oxygen were added by hypodermic syringe just before polymerization was started. The low temperature systems were (1) a potash fatty acid soap recipe with sugar-ferrous sulfate-cumene hydroperoxide activation, (2) a potassium rosin acid soap recipe with similar activation, (3) a polyamine-cumene hydroperoxide activated recipe, and (4) a dodecyl mercaptan-potassium ferricyanide activated recipe.

Bottle polymerizations were carried out with the above recipes to study the effect of addition of various amounts of oxygen (0 to 10 ml. oxygen per 20 g. monomers) on the percentage conversion at two, four, six, and 16 hours. Tentative conclusions based on these data are:

1. Of the five polymerization systems investigated, only two (those containing ferrous sulfate in the activator) are markedly sensitive to the addition of oxygen in small amounts (0.5 to 1.0 ml. per 20 g. monomers).

2. The type of polymerization system, rather than the polymerization temperature, seems to determine the sensitivity to oxygen. The ferricyanide recipe at 41° F. is relatively insensitive to oxygen when compared to the two ferrous sulfate-containing 41° F. recipes.

3. No evidence was obtained to indicate that a small amount of oxygen is necessary for optimum polymerization rate.

Since oxygen was shown to have a major effect on the polymerization activity of the ferrous sulfate Redox systems (undoubtedly due to oxidation to the ferric state) five-gallon reactor polymerizations were carried out in which a chemical "scavenger," sodium dithionite ($\text{Na}_2\text{S}_2\text{O}_4$), was added to destroy oxygen in the soap solution and monomers prior to the addition of the activator system. Improved rates of polymerization were obtained by the addition of 0.05-part; whereas smaller amounts had little effect, and larger amounts caused the polymerization to die off at lower conversions. The interpretation of these data is difficult since the exact oxygen content in these larger-scale reactors was not known, and since it was shown in subsequent bottle runs that sodium dithionite and cumene hydroperoxide were capable of forming a Redox pair in the absence of the iron activator.

It is concluded that since small amounts of oxygen apparently have a greater effect on the polymerization in ferrous sulfate-containing Redox formulations now used for the production of "cold rubber" than on the polymerization of GR-S in the mutual recipe, great care should be exercised to eliminate oxygen from the system at all times.

11:00 A.M. **Low Temperature Stiffening of Elastomers.** S. D. Gehman, P. J. Jones, C. S. Wilkinson, Jr., D. E. Woodford, Goodyear.

The ordinary stiffening of elastomers at low temperatures may be supplemented by

the occurrence of crystallization if the elastomer has sufficient regularity of molecular structure and other conditions are favorable. To study these effects, observations of the progressive stiffening of elastomer compounds at low temperatures were made by measurements of the relative torsional modulus of test strips mounted in racks stored between measurements in a low temperature box. The period of observation was usually 30 days, but in some cases was extended to two months. Temperatures were in the range from about -60 to -20° C.

In the case of *Hevea*, variables studied included plasticizer content, cure, carbon black loading, blending with GR-S, and compressive strain. The effect of compressive strain on the progressive crystallization of *Hevea* compounds was judged by the extent of the recovery when the compression was released. Results are included for Butyl rubber, Redox polybutadiene, and 85-15 butadiene-styrene Redox copolymer compounds.

The degree of vulcanization as determined by the combined sulfur, exerts a controlling influence on spontaneous stiffening, especially for *Hevea*. As the cure is increased, longer periods of induction occur before crystallization becomes evident and the subsequent rate of increase in stiffness is reduced. A combined sulfur value greater than 2.5% (based on the rubber) appears sufficient, judged from these tests, practically to forestall the spontaneous crystallization of *Hevea*. The latent fixed points introduced by vulcanization evidently interfere seriously with the molecular rearrangements required for spontaneous crystallization. Compressive stress, on the other hand, sets up crystal nuclei from which crystallization may readily proceed so that the process is accelerated. Carbon black loading definitely enhanced the short-term stiffening of *Hevea*, but had a relatively small effect in increasing the long-term stiffening of the unstressed samples. For the stress samples at the same compressive strain, the stress was greater with increased black loading, and crystallization was promoted. The admixture of GR-S with *Hevea* did not delay the onset of crystallization, but tended to prevent the stiffening from proceeding as far as it otherwise would. The crystallization of *Hevea* in such blends will depend, undoubtedly, on its rate of cure in the blend. Long-term stiffening effects with plasticizers are complicated similarly by effects on cure and, in addition, by the possibility of low temperature incompatibility.

A broad optimum temperature range, about -20 to -40° C. was observed for the stiffening of the *Hevea* compounds. Progressive stiffening at low temperatures was observed also for Butyl rubber compounds and the Redox polybutadiene and 85-15 butadiene-styrene copolymer.

Although the phenomena of spontaneous stiffening of elastomers at low temperatures are complicated by many factors, a useful degree of generality appears in some of the results.

11:20 A.M. **The Effect of Compounding Ingredients on the Weather Resistance of Neoprene Vulcanizates.** D. C. Thompson and N. L. Catton, du Pont.

The superiority of neoprene vulcanizates in services involving outdoor exposure has been well established. Work presented in this paper shows that compounding ingredients exert a more pronounced effect on the weather resistance of neoprene vulcanizates than has been recognized previously. This point is especially true of non-black stocks.

Exposure tests have been conducted in

Florida, Delaware, and in the Weatherometer. In general, it is shown that the amount of loading is of secondary importance to the type of loading. Data presented show that the weather resistance of neoprene vulcanizates is increased by certain loading materials, for example, clays; whereas it is decreased by other materials, such as whiting. When materials which adversely affect weather resistance are used, the amount of such loading becomes an important factor.

The effect of substituting varying amounts of GR-S or rubber for the neoprene in a clay loaded vulcanizate containing 60% elastomer by volume was studied, and it is shown that increasing the concentration of the less weather-resistant elastomer has a deleterious effect, although the decrease may not always be linear.

11:40 A.M. **Mechanism of Reinforcement. IV. Adsorption of GR-S by Carbon Black.** Leonard E. Amborski and Carl E. Black, III, du Pont, Buffalo, N. Y., and George Goldfinger, University of Buffalo, Buffalo.

Infrared absorption analysis has been conducted to determine whether the adsorption of GR-S (copolymer of polystyrene and polybutadiene) on carbon black is specific as to the chemical structure of the polymer. The comparison of the relative intensities of the characteristic absorption bands of the original GR-S with the ratios of the intensities of the same bands for the fraction of rubber remaining after certain fractions were specifically removed by carbon black has shown that the adsorption is not specific as to chemical structure within the limits of accuracy of infrared analysis. The particular chemical groups considered were the phenyl structure (infrared absorption at 13.20 and 14.27 microns) of polystyrene and the 1, 2 (10.08 and 10.95 microns) and 1, 4 (10.37 microns) addition units of butadiene.

New Calcined Magnesia

MAGNESIA which is calcined for maximum scorch resistance in neoprene compounds is so sensitive to carbon dioxide and to moisture from the atmosphere that pulverizing, with consequent exposure of large surface areas to the air, greatly reduces its efficiency. Calcined magnesia is now made available by General Magnesite & Magnesia Co., Plymouth Meeting, Pa., in lump form, just as it comes from the kilns, and packaged in heat-sealed polyethylene bags for protection from moisture and carbon dioxide.

This lump magnesia reaches the user with its properties as a scorch-resisting material in neoprene undiminished. The lump form does not retard the rate of cure. The mixing stresses in Banburys and mills are so great that the very fragile lumps are completely pulverized, and dispersion in the rubber is at least equal to that of any powdered magnesia.

Rubber Formulary on Display

THE Rubber Formulary, the punched-card service on rubber compounds taken from current technical literature and distributed from Bakersfield, Calif., will be on display at the Chemical Education Book Exhibit at the September, Atlantic City, N. J., meeting of the A. C. S. An article on this service begins on page 698.



At the New York Rubber Group Golf Outing: Foursome at Left: J. Rines and W. Lahey, Both of B. F. Goodrich Chemical Co.; Rufus H. Fairchild, India RUBBER WORLD; W. A. Kingsbury, Shell Oil Co. Head Table at Dinner: A. Eufner and E. B. Curtis, R. T. Vanderbilt Co.; B. MacConnell and J. H. Nesbit, U. S. Rubber Reclaiming Co.; and W. Curtis, Guest. Foursome at Right: K. J. Soule, T. J. Werling, F. J. Pechal, and S. Corigal, All of Manhattan Rubber Division, Raybestos-Manhattan, Inc.

Group Outings Attract Many

THE Chicago Rubber Group held its annual golf outing July 9 at the St. Andrews Country Club, West Chicago, Ill. Approximately 250 members and guests attended the dinner, and 185 players participated in the golf tournament. Arrangements for the outing were made by a committee headed by A. E. Laurence, Phillips Chemical Co., and assisted by John Groot, Dryden Rubber Division, Sheller Mfg. Co.; William Fairclough, Enjay Co.; Maurice J. O'Connor; Harold Stark, Dryden; and Charles Wonder, Van Cleef Bros.

The United Carbon Trophy, donated by Charles Baldwin and awarded annually to the group member having the lowest gross score, was won for the second time by L. B. Wagner, Metropolitan Golf Ball Co., in a toss-off of a tie by Mr. Wagner and Joe Smith, Kraft Chemical Co. Merchandise prizes were awarded to the following: low gross, Messrs. Wagner and Smith and Jim Adams, Sears Roebuck & Co.; most fives, Francis Frost, Frost Rubber Works; most sixes, E. Fik; most sevens, A. Wiegman and Charles Baldwin, United Carbon Co.; high gross, H. H. Irwin, Marbon Corp.; longest drive, Paul Lance, Syracuse Rubber Co.; closest to pin, Joe Showalter, Marbon Corp.; and low score on ninth hole, R. E. Doyle, Kraft Chemical. Following dinner, very many door prizes were distributed through the contributions of some 130 rubber and supplier companies.

New York Group Golf Tourney

The New York Rubber Group held its third annual golf tournament on August 9 at the Winged Foot Golf Club, Mamaroneck, N. Y. As in previous years, the outing was a great success, with 126 players, including 38 guests, participating in the tournament. Some 81 members and guests attended the luncheon preceding the contest, and 133 were present at the evening dinner, which featured the distribution of prizes to winning contestants. Arrangements were handled by a committee headed by E. B. Curtis, R. T. Vanderbilt Co., and including C. R. Haynes, Binney & Smith Co.; J. H. Nesbit and T. T. MacConnell, U. S. Rubber Reclaiming Co.; A. H. Eufner, R. T. Vanderbilt; and B. B. Wilson, India RUBBER WORLD.

Many prizes were awarded to winning contestants in the tournament. First place prizes in the various contests went to the following: low gross for members, F. F. Salamon, Binney & Smith Co.; low gross for guests, Wes Curtis; high score, R. Reale; putting, V. Lake; nearest to pin, R. G. Newberg, Standard Oil Development Co.; and kicker's handicap, G. H. Provost, United States Rubber Co. The grand door prize, a set of irons, was won

by H. W. Day, E. I. du Pont de Nemours & Co., Inc.; while other door prizes went to the following: K. M. Dugan, Bridgeport Fabrics, Inc.; A. R. Partington, Passaic Rubber Co.; C. Hicks, Hatfield Wire & Cable Co.; P. P. Murawski, du Pont; and T. J. Starkie, Witco Chemical Co.

The accompanying photographs were obtained through the courtesy of Jesse S. Young, of Advance Solvents & Chemical Corp.

Second Annual Outing of Buffalo Group

The Buffalo Rubber Group held its second annual summer outing on July 30 at the Lancaster Country Club. Twenty members were present at the morning golf tournament, and this number was later doubled at the afternoon program which included horseshoe pitching, darts, volley ball, and card games. The outing concluded with a steak dinner and the distribution of prizes to winning contestants by Paul Tufts, Barrett Division, Allied Chemicals & Dye Corp., chairman of the outing committee.

Top honors in the bogey golf tournament were won by Emil Kriemann, E. I. du Pont de Nemours & Co., Inc., with Carl Minnig, Continental Carbon Co., a very close second. The doubtful honor of the highest number of strokes on a single hole was shared by Paul Sick, Hewitt-Robins, Inc., and John Augenstein, U. S. Rubber Reclaiming Co. Charles Johnson, Jameson Finishing Co., scored a hole in one and was properly rewarded. The horseshoe pitching contest was won by Mr. Johnson and Edward Martin, Hewitt-Robins.

country and has been responsible for many of our major industrial developments.

In conclusion, Mr. Stringfield stated that patent officials today are requiring more genius in inventions than they did before the war. He warned inventors that in order for their ideas to be eligible for patenting the application must be filed within one year of the first public disclosure. The speaker also stressed the importance of keeping adequate notes in a permanently bound book and emphasized the need of having these notes properly witnessed at frequent intervals to aid in establishing the inventor's right to patent his idea.

A dinner and evening session, sponsored by Kirkhill Rubber Co., followed the technical talk. Entertainment was provided during the dinner, and prizes donated by Kirkhill were won by the following: Macneel Pierce and Tom Keenan, both of Plastic & Rubber Products Co.; J. P. Desmond; Lou Kotich, Ohio Rubber Co.; Del Dreisbaugh and Chris Christoff, both of Kirkhill; Montel Montgomery, Martin Hoyt & Milne, Inc.; Larry Snow, Fullerton Mfg.; Al Hatch; A. J. Hawkins, Jr., and Arch Mease, both of E. I. du Pont de Nemours & Co., Inc.; Howard Erwin, Goodyear Synthetic Rubber Corp.; and Frank Francis, A. Schulman, Inc. Judge Leroy Dawson gave an informal after-dinner talk on "What Makes an American 'Tick'?"

Pacific Exposition and Conference

TWENTY thousand chemists, chemical engineers, and industrial executives from all over the nation and many other countries are expected to attend the Pacific Industrial Conferences, which will run concurrently with the Pacific Chemical Exposition at the San Francisco Civic Auditorium on November 1 to 5, according to Richard Wistar, who is chairman of the California Section, American Chemical Society.

The Conferences will feature 14 one- and two-day sessions presented by the following organizations: the California Sections of the A. C. S. Petroleum and Agriculture & Food Chemistry Divisions; Northern California Sections of American Institute of Chemical Engineers, and Forest Products Research Association; Market Research and World Trade Departments of San Francisco Chamber of Commerce; San Francisco Section of The Society of the Plastics Industry; American Institute of Mining Engineers; California Redwood Association; Federation of Paint & Varnish Production Clubs; Northern California Instrument Association; Northern California Rubber Group; Pacific Insecticide Institute; and Western Market Research Group.

Polyblend Interliner

A NEW Geon Polyblend, 500 N 479, manufactured by B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, O., may be converted into calendered film and used in rubber manufacturing plants as an interliner replacing Holland cloth and similar materials. The new product is a colloidal combination of vinyl resin and Hycar rubber; the latter makes the film ideal for protecting the surface of in-process green stocks.

Furnished in dry powder form, the Polyblend can readily be used in either mill or Banbury mixing operations. The powdered 500 N 479 can be stabilized with standard vinyl stabilizers and lubricants and fluxed either on a hot mill (eight minutes at roll temperature of 280-300° F.), or in a Banbury (drop at maximum power load or stock temperature of 330° F.). The material can be calendered to six- to eight-mill thickness with a roll temperature around 275° F.

Use of the new Polyblend as an interliner offers great production economies since the film may be recalendered after use instead of being discarded. Besides it does not require additional fluxing after the initial heat treatment. For recalendering, it is only necessary to warm the stock on a warm-up mill. Because it is not exposed to severe heat treatment during reuse, it is possible to recalender the stock six or more times.

When a softer film is desired, Geon Polyblend 500 N 479 may be blended with another Polyblend, 500 N 503, to obtain a range of hardness values between the two materials. Films made from 500 N 479 have a tensile strength of 4,100 psi, elongation of 280%, and tear strength of 900 lbs./in.

Viscosity Stabilizer—Modicol S

MODICOL S, a new liquid viscosity stabilizer for natural and synthetic rubber latices, has been announced by Nopco Chemical Co., Harrison, N. J. Use of small percentages of this ready-to-use stabilizer is said to insure an unusual degree of mechanical stability in latex. Similar percentages of the material can also be used to protect GR-S and neoprene against acid coagulation. Modicol S differs from the usual latex stabilizer not only in its effectiveness over a wide pH range, but also in its permanency of effect and its ability to maintain the viscosity of the latex system.

New Cyanamid Chemical

THE new product development department of American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., has announced the availability in trial-lot quantities of beta-chloropropionitrile. The reactivity of this chemical, based on its active halogen and nitrile group, offers promise of use in the production of many useful materials. The chemical is slightly soluble in water, is very soluble in most organic solvents, and has a boiling point of 174-176° C. at 752 mm. of mercury. Research samples and a bulletin giving extensive data on this chemical may be obtained from the company upon written request.

Additional Experimental GR-S Polymers and Latices

ADDITIONS to the list of experimental GR-S dry polymers and GR-S latices, available for distribution to rubber goods manufacturers under the conditions outlined in our November, 1945, issue, page 237, appear in the table printed below.

Normally, experimental polymers will be produced only at the request of the consumers, and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside, if possible, for distribution to other interested companies for their evaluation. The 20 bales, when available, will be distributed in quantities of

one bale or two bales upon request to the Sales Division of Rubber Reserve, or will be held for six months after the experimental polymer was produced, unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received.

These new polymers are experimental only, and the Office of Rubber Reserve does not make any representations or warranties of any kind, expressed or implied, as to the specifications or properties of such experimental polymers, or the results to be obtained from their use.

X-NUMBER MANUFACTURING DATE OF
DESIGNATION PLANT AUTHORIZATION

X-533-GR-S U. S. Rubber, 4-29-49
Borger

X-535-GR-S Goodyear, 5-4-49
Torrance

X-536-GR-S U. S. Rubber, 5-9-49
Borger

X-537-GR-S U. S. Rubber, 5-19-49
Borger

X-538- GR-S-SP U. S. Rubber, 5-19-49
Naugatuck

POLYMER DESCRIPTION

Mixture of 55 parts Philblack 0 and 100 parts of GR-S polymerized at reduced reaction temperature and short-stopped with dinitrochlorobenzene and hydroquinone. Marasperse used as emulsifying agent in carbon black slurry make-up. Mooney viscosity of rubber in latex, 50. Stabilized with 1.5% BLE.

GR-S polymerized at reduced reaction temperature with cationic hydro-peroxide activated recipe emulsified with potassium OR soap and Dresinate #214. Short-stopped with dinitrochlorobenzene. Mooney viscosity of the latex, 55; antioxidant, 1.5% BLE.

Mixture of 55 parts Philblack 0 and 100 parts of GR-S polymerized at reduced reaction temperature and short-stopped with dinitrochlorobenzene. Mooney viscosity of rubber in latex, 50. Stabilized with 1.5% BLE. Marasperse used as emulsifying agent in the carbon black slurry make-up.

GR-S polymerized at reduced reaction temperature with cationic hydro-peroxide activated recipe emulsified with Dresinate 731. Short-stopped with tertiary butyl hydroquinone. Mooney viscosity, 100±10. Stabilized with 1.25% BLE.

New Hydrocarbon Samples

SEVEN new NBS standard hydrocarbon samples have been announced by the National Bureau of Standards, bringing to 169 the number of such compounds now available for calibrating analytical instruments and apparatus in the research, development, and analytical laboratories of the petroleum, rubber, chemical, and allied industries. These samples have been prepared as part of a cooperative program of the Bureau and the American Petroleum Institute, begun in 1943. The new samples follow:

NBS Sample No.*	Compound Formula	Name	Amount Impurity Mole %	Unit fVol.‡
526-5S	C ₆ H ₁₂	cis-2-Hexene	0.20±0.12	5
573-5S	C ₁₃ H ₂₈	n-Tridecane	0.09±0.06	5
574-5S	C ₇ H ₁₄	4, 4-Dimethyl- 1, 2, 3, 5-Pentene	0.09±0.03	5
575-5S	C ₁₀ H ₁₄	1, 2, 3, 5-Tetra- methylbenzene	0.08±0.02	5
576-5S	C ₁₀ H ₁₆	1-Methyl-4-tert- butylbenzene	0.05±0.03	5
577-5S	C ₁₀ H ₈	Naphthalene	0.04±0.03	5
579-5S	C ₁₁ H ₁₀	2-Methylnaph- thalene	0.09±0.06	5

*The designation "5S" indicates a sample of five ml. sealed "in vacuum" in a special pyrex glass ampoule with internal "break-off" tip.

†Purity evaluated from freezing point measurements, as described in *J. Research NBS*, 35, 355 (1945), RP1676.

‡Tolerance approximately ± 10%.

Instructions for transferring standard samples of hydrocarbons "in vacuum" are available upon request. A complete list of NBS standard samples of hydrocarbons, together with instructions for ordering, may also be obtained from the National Bureau of Standards, Washington 25, D. C.

Melamine Dinnerware

(Continued from page 709)

roughly tested and widely accepted by restaurants, hotels, and institutions, and now a number of large molding companies will offer their lines of the product through retail stores. American Cyanamid will run a series of advertisements in consumer publications, and will also cooperate extensively with the actual producers of Melmac dinnerware and with all retail outlets in sponsoring sales to consumers.

The main features of the campaign will stress that this dinnerware is a new type and style of plastic dinnerware unlike the so-called picnicware known in the past. Specifically, breakage resistance, attractive color and design, food insulating properties, resistance to food staining, ability to withstand hot water, and similar characteristics will be pointed out to consumers.

New Durez Compound

DUREZ 14646, an intermediate pressure, general-purpose material which requires approximately one-half the pressure normally used for regular general-purpose phenolics, has been announced by Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y. The new material is designed to fill the gap between the company's low pressure phenolic, Durez 13527, and its regular general-purpose materials. The new material is said to have excellent physical and electrical properties and surface finish and is available in black, brown, and brown mottle colors.

RUBBER WORLD NEWS of the MONTH

Rubber Policy Discussed by Congress and Administration Spokesmen; Business Improvement Hinged to Wage Increase Decision

Rep. Shafer of Michigan in a speech in Congress on August 9 urged a reduction of mandatory consumption requirements for synthetic rubber and an immediate increase in the government buying of natural rubber for stockpiling purposes. An official of the executive branch of the government emphasized that a level of 200,000 long tons a year through-put of general-purpose synthetic rubber was necessary to provide employment for a nucleus of trained technological staff and to provide a substantial incentive for research and development in the various fields of production and end-use. With regard to criticism of continued mandatory consumption of synthetic rubber in the United States, there is nothing today to indicate there are distressed inventories of natural rubber weighing on world markets, and until the production of natural rubber reaches a level adequate to supply world demand, minimum synthetic rubber production in this country does not create any problem for rubber-producing interests, it was said.

Some improvement occurred in business conditions in this country during the past two or three months in which the rubber goods manufacturing industry seemed to be participating. Future business conditions are to a considerable extent dependent on the outcome of wage increase negotiations between management and labor of the Big Four rubber companies. These negotiations, except for those of The B. F. Goodrich Co., were recessed at the end of the third week in August, presumably awaiting the result of the deliberations of the President's fact-finding board on the wage increase demands of the CIO steelworkers union.

More Comment on Rubber Policy

The White House questionnaire sent to 800 companies in the rubber, petroleum, and chemical fields on July 15 was reprinted in this column last month. Further activity in the field of our national rubber policy included a speech made in the House of Representatives on August 9, by Rep. Paul Shafer of Michigan in which he called for a reduction in the mandatory consumption of synthetic rubber in this country and an increase in our rate of stockpile buying of natural rubber. In addition Lockwood's August 15 *Rubber Report* carried an article by a responsible government official explaining the need of governmental authority to assure the continued usage of general-purpose synthetic rubber in the United States.

Mr. Shafer mentioned that the rubber goods manufacturing industry was required to consume 276,000 tons of synthetic rubber during 1948, an excess of 54,000 tons over and above the minimum amount prescribed by the Rubber Act of 1948. Voluntary consumption added another 167,000 tons, making the total for 1948 of 443,000 tons, or approximately 100% more than the minimum amount which it was deemed necessary to produce and consume in the

interests of national security. United States Department of Commerce statistics indicate a consumption of 410,000 tons of synthetic rubber in 1949 and 332,000 tons in 1950, Mr. Shafer said.

"It does not appear that the mandatory use of synthetic rubber, as presently required, can be justified since it seems obvious that the consumption in both 1949 and 1950 will be substantially in excess of the minimum amount required in the Rubber Act of 1948," Mr. Shafer added.

The moot question which to date has remained unanswered: How much synthetic rubber will be consumed annually in the United States on a purely voluntary basis with no government controls or restrictions, could now be settled by eliminating mandatory consumption requirements at once, it was pointed out. This elimination could be effected without violating the law in any way, should present no administrative problem, and would not require any legislative action.

Mr. Shafer complained that the 1941 wartime patent pooling agreement on synthetic rubber, which was to have been terminated by the Rubber Act of 1948, was still in effect.

"There is complete accord both on the part of government and private industry with the principle that a technologically advanced and rapidly expandable synthetic rubber industry should and will always be maintained in this country and likewise that such industry should be privately owned and operated," said Mr. Shafer.

With regard to natural rubber stockpiling, although natural rubber is and has been obtainable in substantial quantities at reasonable prices since the inception of stockpile buying in 1946, the government has not, to the largest extent possible, availed itself of the opportunity to secure this material, it was said. The Senate was criticized for reducing the previously approved stockpiling appropriation bill for the year 1950 by \$275,000,000, and more particularly for indicating a policy of concentration of purchases of commodities available within the United States.

"The very essence of stockpiling for national defense is to procure materials not available within our own borders, the supply of which may be completely cut off in the event of national emergency," Mr. Shafer pointed out.

The present operations of the stockpiling program may be due either to failure of administrative agencies to request Congress for sufficient money or to poor administration of the provisions of the Stockpiling Act. Since the security of the United States is involved, an investigation appears to be in order, Mr. Shafer declared.

In conclusion, it was recommended that the purchase of natural rubber for the government stockpile be resumed and continued as rapidly as possible until our objective is attained and immediately suspend in entirety Rubber Order R-1 or substantially reduce the amount of the re-

quired mandatory consumption of synthetic rubber.

The Case for Mandatory Consumption

In an unsigned article in Lockwood's August 15 *Rubber Report*, the case for mandatory consumption was presented by a "responsible government official."

"It should be emphasized that reasonable dispersion of active minimum efficient feedstock and copolymer facilities, from a national security standpoint, calls for approximately a 200,000-long-ton level of general purpose synthetic rubber. Such a level of through-put would provide for the employment of a nucleus of trained technological staff and would provide a substantial incentive to research and development in the various fields of production and end-use," this article stated.

"The attacks on the mandatory consumption method of assuring synthetic rubber usage in this country raise many questions as to the real motives behind them. Indications are that they are using the mandatory control method as a front when in reality the attack is on the basic national rubber policy of the United States," this article continued.

It was pointed out that specification controls, which are simply a device to carry out the basic rubber policy, are not an invention of government, but were advocated by industry as the best means by which the government could, with equity to large and small manufacturers of rubber products, satisfactorily assure the continued usage of synthetic rubber with the least hardship.

That specification controls were the best method of meeting the objectives of United States rubber policy and that there is need to continue the authority to implement this policy were supported by the following conclusions: (1) Natural rubber will replace synthetic rubber in bulk consumption items whenever the price of natural rubber permits the manufacture of lower priced adequate finished products.

(2) Without mandatory controls consumers will force the utilization of the most economical raw material. (3) Specification controls have worked successfully for several years, are sufficiently flexible to permit reasonable adjustments within the limits of national security minimums, permit maintenance of balanced consumption based on sound technical grounds, are understood by consumers and manufacturers alike, and avoid untoward interference with the reclaimed rubber industry. (4) It would not be administratively feasible to drop controls and then to reinstitute them if voluntary action on the part of industry did not produce the desired minimum consumption figure. (5) Further research and development may ultimately overcome the technical quality deficiencies of synthetic rubber for bulk consumption, but even then relative cost of adequate raw materials will remain the basic consideration.

It was added further that it should be recognized that the United States has gone more than half way in setting its security minimum operating general-purpose and special-purpose synthetic rubber levels at 200,000 long tons and 21,700 long tons, respectively. It is well known that the major portion of the synthetic plant facilities will be maintained in a non-active standby condition at considerable government expense. Thus a fair compromise of all facets of the problem has been attempted in the broad national security interest. There is nothing today to indicate that there are any distressed inventories of natural rubber weighing on world markets, and until the production of natural

rubber reaches a level adequate to supply world demand exclusive of synthetic minimums, the maintenance of these minimums does not create any problem for rubber-producing interests. Constructive work for the future should assure a market for all the rubber of all kinds that actually are produced.

Industry Trends

Business in general has shown a slight upturn in the last two or three months, according to Commerce Department reports. The extent of rubber industry participation in this upturn is difficult to judge from the available limited figures. The regular monthly report of the Rubber Manufacturers Association Inc., on tire and tube production and shipments stated that manufacturers' shipments of passenger-car tires during June totaled 6,598,518 units, an increase of 11.6% over May shipments. Production of these tires increased during June to 6,470,724 units from 5,980,837 the previous month; while inventories of 10,618,442 were 1.4% less than the 10,769,289 units at the end of May.

Truck and bus tire shipments also increased in June to 937,721 units from the 915,037 shipped in May. Production was down 3.4% to 921,143 from 953,489 units in the previous month. Inventories of 2,515,374 showed little change from the end of May.

Shipments of automotive tubes increased 21% in June to 6,409,215 units, against 5,296,063 the month before. Production was up 5.6% to 6,430,026 from 6,088,164 in May, and stocks were 12,465,760 units, against 12,410,463 at the end of the previous month.

Another RMA report on rubber consumption, this for the month of July, stated that consumption dropped 17% in that month to 69,294 long tons from the 83,664 tons used in June. The sharp decline in consumption was partially attributed to the numerous annual shutdowns in the industry for vacations and maintenance work.

Consumption of natural rubber in July amounted to 39,329 tons, a reduction of approximately 16% from the previous month, when 46,739 tons were consumed. Synthetic rubber consumption declined to 29,965 tons from 39,925 tons in June, a reduction of about 19%.

Consumption of synthetic rubbers, according to types, in July was: GR-S, 23,801 tons; neoprene, 1,853 tons; Butyl, 3,928 tons; and nitrile types, 388 tons.

For the first seven months of this year, 329,636 tons of natural rubber were consumed, against 370,738 for the same period of 1948, a reduction of about 11%. The total synthetic rubber consumed in the same seven months' period amounted to 248,733 tons, against 260,215 tons the year before, or a reduction of approximately 4%.

According to one report, attributed to industry sources, prices of rubber transmission and conveyor belting became firmer in August, eliminating considerable price cutting on unofficial quotations. The only item remaining on lower competitive pricing trend is a limited range of smaller products, many of which are sold through chain stores, it was said.

Returning again to business conditions in general, a portion of the "Business Climate" section of Lockwood's August 15 *Rubber Report* summarizes the situation briefly and very much to the point:

"Other than autos and building, most industries are experiencing a competitive struggle for the available business among the individual businesses making up each industry."

"Wage and price stability is lacking, and it is not clear what effects coming wage

settlements will produce—strikes, wage increases or further negotiations.

"Price adjustments between agricultural products and industrial products remain to be completed. The entire agricultural problem is due for serious adjustments in the near future. Another year of surplus crops and price supports will undoubtedly force this issue."

"Finally, clear and firm business policies cannot be fully exercised while the government's fiscal policies remain unpredictable. The Federal Treasury has resumed a policy of new-money borrowing after getting along since the war on taxation funds and the large working balance that was left in the Treasury at the end of the war. The government's commitments and potential commitments loom large. The resulting consequences of the newly adopted policy of borrowing to spend (over and above taxation receipts) cannot be foreseen."

Labor-Management Relations

The wage increase and pension demands of the United Rubber Workers of America, CIO, were discussed between the Goodyear Tire & Rubber Co. and union representatives beginning on August 1 in Cincinnati, O.; between United States Rubber Co. and the union, beginning August 8, in New York, N. Y.; again discussed by Goodrich and the union, also beginning on August 8 in Dayton, O.; and between the Firestone Tire & Rubber Co. and the union beginning August 15 in Cleveland, O. Similar discussions were scheduled between The General Tire & Rubber Co. and the union to begin on August 29, also in Cleveland.

All of these talks except those between Goodrich and the union were recessed by the end of the third week in August, officially awaiting the finding of the President's fact-finding board in the wage increase demand of the CIO steelworkers' union.

The Goodrich local unions in Akron and elsewhere had, as a result of a strike vote taken during the first week of August, authorized their union officials to call a strike to enforce their wage and pension demands, if such action was deemed necessary. According to the Goodrich contract, the strike or strikes at its various plants could not take place before August 26, when a strike actually was called.

The president of the Akron local union of the Goodrich main plant in that city was reported to have taken the position that the rubber workers' demands have no relation to that of the steel workers and indicated that his local union did not intend to wait until the President's fact-finding steel committee reported. Presumably all the other local unions of the Goodrich company may follow the same policy since they have all voted to take strike action.

Meanwhile, at the Akron plant of the Goodyear company on August 4 about 300 workers in the mat manufacturing department were affected by a strike of 56 who objected to the disciplining of one of their number for not following specifications.

About 3,000 workers at the Akron plant of the Firestone company on August 8 were idle when compounding room workers walked out over a change in wage rates. Production was resumed after a two-day work stoppage.

Because of business conditions, 700 workers of the Goodrich Akron plant were dismissed on August 1.

Goodrich Strike Called August 26

As we were going to press it became known that the Goodrich Company plants

in Akron, Tuscaloosa, Ala., Cadillac, Mich., Clarksville, Tenn., Los Angeles, Calif., Oaks, Pa., and Miami, Okla., were closed August 26 either by strikes or mass vacations.

The Akron local union president, George R. Bass, at a mass meeting of local 5 of the URWA, near the Goodrich plant on August 28 stated that:

"This is not going to be a tea party, but a fight we can win only if we gather together all our resources."

There were indications that the company was prepared to sit out the strike at least until the President's fact-finding panel made its report in the dispute which is current between the steel industry and the United Steel Workers.

Meanwhile a former member of the executive board of the local URWA union of U. S. Rubber's Detroit plant accused Mr. Bass of fomenting the strike purely for the purpose of influencing delegates at the Toronto, Ont., Canada, convention of the international union this month. Mr. Bass was an unsuccessful candidate for the presidency of the international union at its last convention and is likely to renew his campaign at Toronto. This union member stated that the Goodrich strike was needless at this time with the steel-dispute recommendations expected within two weeks and in view of the fact that the pattern for the rubber workers in each of the three previous postwar wage increases had followed a pattern set in steel or auto union disputes.

Mr. Bass denied this accusation by stating that gambling with the fate of the 17,000 Goodrich rubber workers would be an insult to their intelligence and that the Goodrich company was deliberately trying to smash the local union and that the union members would walk the picket lines until the company changed its mind.

Starts Plastics Production

The vinyl film plastics division of Mansfield Tire & Rubber Co., Mansfield, O., has now advanced to the stage where the first runs of plastic material have been completed, shipments of the film begun, and three shift leaders appointed. The first sheets of vinyl film, of the translucent or "frosted" type, were recently processed, and production is beginning on opaque film of the type used in draperies. Approximately 15,000 pounds or 60,000 yards of the film will be manufactured each day when production reaches its peak. At present only one calender unit has been modified for processing vinyl film, but work is going ahead to complete two more units. With all three units in operation, the personnel for the division will number approximately 100 persons.

The three newly appointed shift leaders are C. H. Stetson, Jacob Gruneison, and Carl Gordon, each with a history of service in different departments of the company.

Johnson Rubber Co., Middlefield, O., has appointed W. C. Klann, Jr., and Phil Smith, sales engineers working out of the Detroit office. Mr. Klann was for 14 years with Fisher Body and for five years with Murray Corp. Mr. Smith for two years was Detroit district engineer for The General Tire & Rubber Co., and also spent five years in the sales department of the industrial products division, Firestone Tire & Rubber Co.

EAST



Feted United Engineering Executives (Left to Right): F. C. Biggert, K. C. Gardner, G. W. Knotts

50-Year Executives Honored

The first 50-year employees of United Engineering & Foundry Co.—three members of the top management—were honored July 26 in ceremonies attended by the 500 headquarters staff of the company in its new building in Duquesne Way, Pittsburgh, Pa.

F. C. Biggert, chairman of the board, K. C. Gardner, president, and G. W. Knotts, a director and machinery consultant, were presented with pins and scrolls signifying their association with United Engineering and predecessor companies for a half century. The presentation was made by William Metcalf, Jr., a director of the company since its organization.

Mr. Biggert entered the employ of the Frank Kneeland Machine Co., Pittsburgh, in the engineering department in 1899. He served as president of United Engineering from 1919 to 1928.

Mr. Gardner became a salesman for Lloyd-Booth Co., Youngstown, O., in 1899. He was made president of United Engineering in 1943.

Mr. Knotts began his service with Lincoln Foundry Co., Pittsburgh, in 1899. Prior to becoming machinery consultant for United Engineering he was manager of the Youngstown district plants.

United Engineering was formed in 1901 as a merger of several companies, including Kneeland Machine, Lloyd-Booth, and Lincoln Foundry.

Hot Strip Mill for French Firm

Mr. Gardner later in the month announced receipt of an order from Société Lorraine de Laminage Continu for a new hot strip mill. The contract was signed in Pittsburgh by Raymond Colmant, director of the French concern, and is for a six-stand continuous hot reduction mill together with roughing stands, tables, shearing line, and auxiliary equipment. It represents the largest single contract obtained up to this time by an American concern for rolling mill machinery to be financed through the ECA. The Société Lorraine de Laminage Continu, more commonly known as SOLLAC, is one of the outstanding French steel producers and will erect the mill in the northern part of France.

Intercontinental Rubber Co., Inc., and Continental-Mexican Rubber Co., Inc., on August 19 moved their New York offices to 50 Broad St., New York 4, N. Y.

Promoted by Diamond Alkali

Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, O., has made Earl J. Mills manager of the Southwest sales district, which embraces Texas, Oklahoma, and Kansas, and has put Charles W. Klaus in complete charge of sales activities covering Illinois, Indiana, Iowa, Michigan, Minnesota, Wisconsin, and Nebraska.

Mr. Mills, now headquartered at Houston, Tex., has been with the company 17 years and was manager of less-carload sales at the Chicago sales office for the past 2½ years. In his new capacity he will have supervisory responsibility of Diamond's branch offices at Wichita, Oklahoma City, Houston, and Dallas.

Mr. Klaus came to Diamond Alkali in 1947 as manager of carload sales at Chicago, where his headquarters remain. He has been in chemical sales nearly four decades.

In announcing the above changes Fred W. Fraley, vice president in charge of sales, stated that enlarging the company's long-established branch sales operations at Wichita, Oklahoma City, Houston, and Dallas, creation of this Southwest sales district, and appointment of Mr. Mills as its manager, together comprise a move designed to "expand and coordinate Diamond's existing sales activities and service facilities throughout the Southwest."

Plans Plant in Carolina

Russell Mig. Co., Middletown, Conn., has announced that negotiations are under way for opening a branch plant in Bennettsville, S. C., about January 1, 1950. If plans materialize, a 54,000 square-foot building will be built at Bennettsville to be operated by a subsidiary, Russell Products Co., on a long-term lease with option to purchase. The plant will employ 135 persons at the start to produce certain types of narrow fabrics. The new plant will give the Russell company facilities for production of new products and provide for expansion in present lines, President G. M. Williams said.

The company is Middletown's largest industry, employing 1,300 persons, and manufactures brake lining and clutch facings, transmission and conveyor belting, elastic and non-elastic fabrics, and aero products. The company is also one of the largest in the United States in production of slide fastener tape and Venetian blind tape.

Transfers Elkton Division

The operations of the Elkton Division, Thiokol Corp., Trenton, N. J., have been transferred from Elkton, Md., to the Rocket Research & Development Center, Redstone Arsenal, Huntsville, Ala. This location has many advantages and affords additional facilities and space not available at Elkton. The operations are now being conducted in wholly owned government facilities and will result in economies that would not be possible at the former location.

Thiokol is engaged in research and development work on solid fuels for rocket and jet assist units and is working under contract to the United States Army Ordnance.

This division is now known as the Redstone Division of Thiokol Corp. and is under the direction of W. M. Mebane.

Now Making "Cold Rubber"

The Port Neches, Tex., synthetic rubber plant operated for the government by B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, O., began the production of "cold rubber" in August, following the installation of necessary refrigerating equipment. The plant's rated capacity, when in full production, is 30,000 tons a year. It is estimated that the nation's synthetic rubber plants will be producing 15,000 tons of "cold rubber" a month by October.

New Packaging for Good-rite Resin 50

Good-rite Resin 50, Goodrich Chemical's high styrene-butadiene copolymer, will no longer be furnished in the standard 200-pound Lever-Pak drum, but in easy handling 50-pound bags, it was announced by W. D. Parrish, sales manager for Hy-car and rubber chemicals. Designed especially as a stiffening agent for rubber stocks, Good-rite Resin 50 is used in shoe soles, floor tiling, and insulation compounds and provides high hardness, low gravity, good flex life, and excellent low-temperature properties. Compounding and processing information on this material is given in a new technical service bulletin, RC-2, available upon request to Goodrich.

Forms New Company

Ames Rubber Corp., Hamburg, N. J., recently was organized to manufacture typewriter platens, feed rolls, and feet for Ames Supply Co., Chicago, Ill., which has been furnishing parts for business machines since 1902. Ames Rubber, which will also supply other makers of business machines, plans, besides, manufacture of miscellaneous molded goods, molded metal-rubber assemblies, extrusions, and rolls. The company, occupying a modern plant at Hamburg, formerly owned by Jersey Plastics Co., will employ about 50 workers.

Officers of the new concern are: Hazen R. Ames, president; J. H. White, Jr., vice president and general manager; Laurence Edland, vice president and sales manager; Mrs. Dorothy R. Ames, treasurer; and C. T. Bills, secretary. Mr. Edland was formerly vice president and research director of Rodic Rubber Corp., New Brunswick, N. J.



Irving Underhill, N. Y.

Laurence Edland

Changes at du Pont

George E. Holbrook has been named assistant director of the technical division of the organic chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The appointment shifts Dr. Holbrook to Wilmington from the Chambers Works at Deepwater Point, N. J., where he was a general superintendent of development. He started with the company in 1933 as a research chemist.

Dr. Holbrook's position at the Chambers Works will be filled by John E. Cole, general assistant production superintendent at the plant. He came to du Pont in 1929.

In other changes in the department's organization, Edgar W. Thompson, production manager for the rubber chemicals division, was named manager of the company's neoprene chemical rubber plant at Louisville, Ky.; while Emory F. Ridlon, the present manager, was placed in charge of tetraethyl lead manufacture at the Chambers Works.

Mr. Thompson has been with du Pont since 1931. He went to the Chambers Works in 1934 and served as superintendent of neoprene production there before becoming rubber chemicals production manager in 1940.

Mr. Ridlon began with du Pont in 1929 as a student operator in the rayon plant at Buffalo and held various executive positions in tetraethyl lead manufacture at the Chambers Works and at Baton Rouge, La., before becoming assistant manager and, in 1940, manager of the Louisville plant.

Holds Sales Conference

The annual sales meeting of the Cameron Machine Co., 61 Poplar St., Brooklyn 2, N. Y., was held at the St. George Hotel from August 15 to 19. Attended by the company's sales and service men covering United States and Canada, the week-long meeting was highlighted by the formal opening of Cameron's Plant #2. Situated in the Williamsburg section of Brooklyn, the entire capacity of the new plant will be devoted to the production of rolls for slitting and winding machines used by the paper and textile industries.

The sales meeting program was directed at acquainting Cameron field representatives with recent developments in machine design improvements in both mill type and converters. Speakers on the program included Palmer J. Lathrop, president; Joseph Scheuermann, sales manager; Thomas Carter, chief engineer; Eugene Ward, service manager, and Paul Withstandley, advertising manager.

Elections at Bearfoot Sole

The Bearfoot Sole Co., Inc., Wadsworth, O., last month announced the election of three new directors: Attorney C. Brouse; C. E. Chandler, vice president of the first National Bank of Akron; and Timothy D. Calvin, Bearfoot's director of purchases and industrial engineer and son of I. B. Calvin, company treasurer. Other directors reelected are Edwin Calvin, founder of the company; Attorney Horace Guild; Ernest Calvin, vice president and assistant treasurer; and I. B. Calvin. O. E. Eldridge is director of public relations for the company.

Charles A. Moore has joined Bearfoot Sole to fill the vacancy caused by the resignation of Hugh McCulloch, industrial relations administrator.



Chester L. Arnold

Stauffer Chemical Co., 420 Lexington Ave., New York 17, N. Y., has appointed Chester L. Arnold director of research for the company. Dr. Arnold, formerly director of research, western division, will continue his personal supervision of western research activities and for the present will make his headquarters in Richmond, Calif.

John F. Crowther, assistant director of research for the company, has been named director of the eastern research division. He will transfer his offices from New York, N. Y., to the process development laboratory at Chauncey, N. Y.

Expands Sales Representation

Felton Chemical Co., 599 Johnson Ave., Brooklyn 6, N. Y., last month reported several changes among its representatives in the South.

James Leonard was named to cover Texas and western Louisiana. The company's new Dallas, Tex., address is 1207 S. Industrial St., where stocks of Felton products will be carried better to serve the territory.

David Marso has been transferred from Brooklyn to Atlanta, Ga., to travel the southeastern states.

Leo C. Weinrobe, with headquarters in St. Louis, Mo., will continue to service Missouri, Kansas, Oklahoma, and Arkansas and will also act in a general supervisory capacity for the entire southern territory.

Offer New Casein Fiber

Arthur D. Little, Inc., Cambridge, Mass., and Rubberset Co., Newark, N. J., have developed a new curled casein fiber for use where the resiliency of horsehair previously has been uniquely suitable. Known as Caslen, the new fiber, produced by Rubberset, is used as a single filament a few thousandths of an inch thick, is cheaper than the best quality horsehair, equally resilient, and much more dependably uniform and available, it is claimed. In addition to its favorable price situation, Caslen is uniformly clean and is believed to be non-allergic. The filament can also be treated to make it mildewproof, mothproof, and bacteria-proof.

Forms New Association

The Friction Materials Standards Institute, Inc., 370 Lexington Ave., New York 17, N. Y., has been organized under the membership corporation law of The State of New York for the purpose of continuing the publication of the "Automotive Data Book," formerly published by the Brake Lining Manufacturers' Association, now dissolved.

The charter members of the new corporation are: Fibre & Metal Products, Inc.; Gatke Corp.; Grizzly Mfg. Co.; Lascos Brake Products Corp., Ltd.; Marshall-Eclipse Division, Bendix Aviation Corp.; Molded Materials Division, Carlisle Corp.; Raybestos-Manhattan, Inc.; Russell Mfg. Co.; Scandinavia Belting Co.; Southern Friction Materials Co.; The S. K. Wellman Co.; and World Bestos Corp.

At the first annual meeting of the membership held at the Commodore Hotel, New York, the following directors were elected: Joseph G. Brown, Grizzly; Amor P. Smith, Russell; Vincent A. Spina, Scandinavia; Frank Miller, Raybestos-Manhattan; Frederic Weyburne, Marshall-Eclipse; George E. Ritter, Molded Materials; and Thomas L. Gatke, Gatke Corp.

The officers for the current year are: Mr. Smith, president; Mr. Gatke, vice-president; William H. Dunn, treasurer; and Harriet G. Duschek, secretary.

In discussing the purpose for which the Institute was organized the members were enthusiastic over the services that will be available to them through the Institute, by the rendering of technical assistance through the publication of data relating to detailed specifications of brakes and clutches and by supplying members with engineering information as to sizes, types, and drilling patterns where required by brake linings and clutch facings as furnished by car, implement, brake, and clutch manufacturers. It was revealed that this information would be supplied to the members in the form of blueprint specifications and through the publication of its data book and special bulletins.

This was declared to be the sole purpose of the Institute.

Opens New Laboratory

National Automotive Fibres, Inc., Trenton, N. J., opened the new laboratory of its Trenton division in July to provide increased laboratory space and equipment in line with the company's policy of developing products for the automotive industry. The Trenton plant produces coated fabrics, automotive carpeting, suede, and vinyl film. The laboratory work incidental to the use of rubber and plastics in automotive products has necessitated work on applications of a widely varied nature by the Trenton staff. According to John R. Millar, company president, and Robert J. Stack, executive vice president, the new laboratory will be an important factor in the company's progress in a specialized field. John G. Harrison is director of the Trenton laboratory, and George W. Parkin, Trenton division plant manager, coordinates activities of that plant with the manufacturing and sales interests of the other company plants.

Hodgman Rubber Co., Framingham, Mass., is among the many concerns exhibiting at the National Hardware Show to be held at Grand Central Palace, New York, N. Y., October 12-15.

DOW CORNING SILICONE MOLD RELEASE EMULSION NO. 35A



Fewer Rejects

Intricate molded products such as these automobile window ventilator sealing strips must have uniformly finished edges and be free of tears and uneven surfaces. DC Mold Release Emulsion No. 35A is used in molding this production by Yale Rubber Mfg. Co. because it improves stock flow to intricate parts of the mold thus eliminating not-filled-out rejects.



Easier Release

Roller skate wheels molded of heavily loaded stock at Yale Rubber Mfg. Co., cannot be flexed in stripping. Proper release of such pieces depends on the slip of the mold surface. DC Mold Release Emulsion No. 35A thoroughly wets and adheres to metal surfaces, permitting unusually easy release of molded pieces regardless of the stock.



Improved Finish

Gear shift lever boots molded of light colored stock at Yale Rubber Mfg. Co. must match the decorative colors in automobile interiors. Consequently, the boots must be clean, perfectly shaped and unstained when taken from molds. DC Mold Release Emulsion No. 35A will not stain the parts and it leaves molds clean, free from carbonaceous deposits.

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New Belt and Bearing

United States Rubber Co., Rockefeller Center, New York 20, N. Y., has announced the addition of round endless belts to its U. S. Rainbow line for use on drills, high-speed hammers, tappers, saws, sewing machines, wood working tools, and other small machinery applications. The belts are of round cross-section and built without a splice, thus minimizing vibration. Cord pulling members keep stretch at a minimum; while bias-cast jackets protect the inner structure and insure flexibility. The belts are available in sizes ranging from 3/16-inch to 1 1/2-inch belt diameter and from 6 1/8 to 156 1/8 inches inside circumference.

Development of a new rubber bearing which radically simplifies the design of oil well pumping units has been announced jointly by U. S. Rubber and Cabot Shops, Inc., Pampa, Tex. The new bearing, which is used in the newer assembly, reduces from 100 to 38 the number of parts required for pumping unit construction. Field tests in Texas and Louisiana oil fields have shown the rubber bearing to wear at least twice as long as the standard-type installation. In a special test a rubber bearing assembly was given a severe unbalanced load and operated at three times normal field operating speed. Under these unusual conditions, the bearing completed more than 40 million cycles, outwore many of the structural metal parts in the unit, and still maintained serviceable operating condition. The rubber bearing has also been found greatly to reduce shock load as compared to standard-type bearings.

Changes in Personnel

Howard H. Weber has been made general sales manager of the wire and cable department, to supervise sales of rubber insulated building wire, service entrance cable, armored and non-metallic sheathed cable, portable cord and cord sets, Uskon electric radian heating, battery separators, Electrix wiring devices, and other specialized electrical wires for the radio, television, mining, construction and electrical industries.

Four divisional managers have been appointed to the electrical wire and cable department to supervise sales of electrical wire and cable throughout the country.

Clarence H. Le Vee has been named eastern division sales manager with headquarters in New York. He will supervise sales in Boston, New York, Buffalo, Syracuse, Philadelphia, Baltimore, Atlanta, and Pittsburgh branches.

J. A. Leuver has been made western division sales manager with headquarters in Chicago and will supervise sales in Cleveland, Detroit, Chicago, Cincinnati, Indianapolis, Milwaukee, Minneapolis, and Omaha branches.

Don B. Karlkind has been appointed southwestern division sales manager with headquarters in Dallas, Tex., in charge of branch sales in Birmingham, New Orleans, Houston, Dallas, Kansas City, Tulsa, St. Louis, and Denver.

L. M. Guibara now Pacific Coast division sales manager with headquarters in Los Angeles, is in charge of branch sales in Los Angeles, San Francisco, Portland, Seattle, and Salt Lake City.

Matthew J. Delehaunt has been named district sales manager for the Pittsburgh, Pa., branch of the mechanical goods division, succeeding J. W. Greenwald, retired. Mr. Delehaunt joined United States Rubber in 1922 as a clerk in the Pittsburgh branch. For 15 years he specialized in the

sale of the company's wire products and served in various administrative and sales capacities. In 1937 he became a salesman for the mechanical goods division with headquarters in Pittsburgh.

Peter C. Anderson, special representative in the tire division at Chicago, was retired August 1, after 52 years continuous service with the company. He started as an office boy in 1897 with the Morgan & Wright Tire Co., Chicago, which later became part of U. S. Rubber. Mr. Anderson next held various positions in the credit and accounting department and in 1908 was promoted to assistant branch manager. He was appointed western sales manager for U. S. Tires in 1918, a position he held until the outbreak of World War II, when he was made a special representative handling original equipment sales.

L. M. Boulware, assistant manager of the Fisk Cord Mills, New Bedford, Mass., has been appointed manager to succeed F. L. Burns, retired. Mr. Boulware joined the rubber company in 1938 as assistant to the overseer of the twisting department at the Winnsboro Mills, Winnsboro, S. C. Since then he has worked in the development department at Winnsboro, in the Detroit tire plant and in the textile division development department at Hogansville, Ga. After his return from four years of military service, Mr. Boulware was made technical supervisor of the company's Scottsville, Va., plant. Then in 1947 he was transferred to the Fisk Cord Mills as technical supervisor and in January 1949, was made assistant manager.

Mr. Burns has the distinction of having been employed only once in his long career in the textile industry, starting in 1898 with Greene & Daniels Co., Inc., Pawtucket, R. I., which was subsequently purchased by Fisk Rubber Co., which in turn was acquired by U. S. Rubber in 1940. Mr. Burns was named superintendent of the Fisk plant in Westerly, R. I. in 1920 and was appointed manager of the U. S. Rubber plant at New Bedford in 1945.

More Tubeless Tires

Tubeless tires will be manufactured in the Los Angeles plant of The B. F. Goodrich Co., Akron, O., starting September 1, according to T. G. Graham, vice president. This new tire is also being made in three other plants, Akron, Miami, Okla., and Tuscaloosa, Ala. The tire is being sold in five of the company's districts, Cincinnati, Indianapolis, Jacksonville, Minneapolis, and Pittsburgh and will be offered in the Pacific Coast region as soon as inventories are built up there.

New Spray Hose

A new spray hose, designed to utilize working pressures as high as 800 p.s.i., made in long lengths, and designed to handle many sprays of the type which have previously been destructive to rubber, has been announced by Goodrich. Compounds of oil resistant rubber make the new hose highly satisfactory for use with all types of horticultural sprays. The hose can also be employed on hydraulic equipment, in car washing units, and for carrying materials used in undercoating automobiles. The hose is black, has a lead-press molded finish on the cover and has a braided construction with a new-type high tensile cotton yarn which makes possible the use of only two braids in all sizes except the 3/4-inch hose, which is made in three braids.

Tubing Electronically Vulcanized

A unit at Goodrich's Plant 4 in Akron has vulcanized electronically more than nine million feet of red syringe tubing during the past 18 months. The method and apparatus for continuous curing of strip, channel, and tube stock were developed by the company's machine and process development division. C. E. Leguillon, division manager, says that this unit permits the visualizing of the production of goods from mixing mill to box car in 20 minutes.

Transfer of Goodrich Personnel

Two appointments in the Pacific Coast division of the replacement tire sales division have been announced. J. E. Wacksmuth, Los Angeles district manager for the last 10 years, has been named to the newly created post of dealer sales development manager and is succeeded at Los Angeles by Don Hamilton, general supervisor in the district for the last year. Mr. Wacksmuth has been with the company 33 years and in his new work will cooperate with dealers in the 11 western states in the division with headquarters in Los Angeles. Mr. Hamilton joined Goodrich in 1927 and had been retail store supervisor and general supervisor in the Cleveland district before being transferred to the Pacific Coast.

E. R. Traxler has been named manager of the new flat belting field engineering and development department. He has been with Goodrich since 1935; all of his career has been spent in product development.

Reducing Output in Argentina

The Firestone Tire & Rubber Co., Akron, O., last month revealed that its plant in Buenos Aires, Argentina, has been forced to curtail production because of a continuing shortage of pigments, but the plant will continue to operate as long as the present supply of raw materials holds out. Difficulty in obtaining these pigments from the United States is based upon the shortage of dollar exchange.

Recent Firestone Developments

A new seclusion room, designed to provide maximum safety, comfort, and freedom of movement for patients in mental institutions, has successfully undergone initial tests at Cleveland State Hospital. The room is completely cushioned with special types of Firestone Foamex cushioning, covered with a tough, durable, latex-coated fabric. A non-injurious, rubber-mounted screen, which eliminates the need of barred grilles, was developed by Firestone for windows of the room. Besides its safety features the room, which contains a built-in cushioned bed, can be easily cleaned with soap and water.

A rubber-cushioned steel shipping shell that will protect jet aircraft engines from damage by jars and jolts has been announced by Firestone. The containers, known as Airpaks, are being made by the rubber company for Westinghouse J34 jet aircraft engines. Each cylindrical container measures 138 inches long and 47 inches in diameter and is made in two sections which encase the engine. After the engine is bolted into the container, the unit is sealed, pressurized, and mounted on skids with a specially designed rubber air spring suspension system. Pressurizing the container protects the engine from humid

air; while resistance to varying shock forces can be controlled by adjusting the air pressure in the rubber spring unit.

Firestone's development of the Wire Cord tire is said to be one of the most important postwar advances in tire technology. For the first time, internal arrangement of the tire cord can be inspected by X-rays to assure precision placement of the cords in the tire. Although used by buses and trucks on some of the longest, hottest, and fastest runs in the country, no Wire Cord tire has ever been known to blow out.

Lyon New Tire Development Manager

W. E. Lyon has been advanced to the position of tire development manager. He had joined Firestone's 1929 college training class following his graduation from Cornell University. His first assignment was on tire specifications and quality control in the tire engineering department. After 11 years of varied experience in the department he was named its manager. During World War II, Mr. Lyon was active on several government and military advisory committees concerned with development and use of tires. He is a director and past president of The Tire & Rim Association, Inc., and a past chairman of the Akron-Canton Chapter of the Society of Automotive Engineers. Mr. Lyon succeeds B. Darrow, who recently resigned after more than 35 years in the tire industry.

Foam-Latex Mattress Price Cut

Firestone Industrial Products Co. has announced reductions of \$10-\$20 in its suggested retail prices of Foamex mattresses, with corresponding adjustments in the company's wholesale prices to bedding manufacturers. Under the new suggested price schedule, the 4½-inch "form-fitted" mattress would sell at \$79.50 in either the double- or twin-bed size; while the three-inch standard mattress in either double- or single size would retail at \$69.50. These reductions are expected materially to broaden the consumer market for foamed latex mattresses.

Adding to Plant

A \$125,000 expansion program has been revealed by Harold G. Taylor, president of Plastic & Rubber Products, Inc., Dayton, O., manufacturer of "O" ring hydraulic seals. This program calls for a 16-by 30-foot two-story addition to the general office and a 40-by 60-foot two-story plant addition complete with the latest type of electrically heated rubber presses. Work on the buildings and the installation of the machinery are to be completed by December 1.

In the past five years this firm has grown from a force of 45 employees with a Dayton sales office to 150 employees with sales offices also in New York, Chicago, Detroit, Cleveland, Los Angeles, Houston, Seattle, Tulsa, St. Louis, Miami, and Minneapolis. The company maintains field engineers at these locations to assist manufacturers in the adaptation of this new-type seal to their products.

Mr. Taylor also announced that Robert E. Allen, vice president, who has had charge of the firm's Chicago office for the past four years, has been transferred to Dayton headquarters.

Testing Goodyear Products

Goodyear Tire & Rubber Company, Akron, O., announced that its new special tire-test road is a complete success and that its technicians are conducting continuous tests further to improve the safety and quality of tires. Scientifically constructed, the road is on the grounds of the company's Plant 3 in Akron. The road is flat or uncrowned, with a slight lengthwise slope following the average gradient of the terrain and has a smooth, even surface. A portion of the road was specially treated to make a "slick spot," similar to those often encountered on highways. When flooded with water, this spot permits measuring the skid-resisting action of tires on a test car under the same conditions as on a treacherously slippery highway during a rainstorm. The road is also designed to facilitate the use of test instruments to compare the relative enveloping power or "ride" of tires. Other tests made with special instruments determine cornering power (measurement of the steering angle, speed, attitude angle of the car, and roll or tilt) and tire resistance to centrifugal force of the car.

Use of a new road-surfacing material containing powdered rubber in an experiment designed to reduce skid hazards on asphaltic pavement was tested recently by Ohio State Highway Department engineers near Akron. The composition of sand-slag and a powdered synthetic rubber, furnished by Goodyear, was spread approximately $\frac{1}{8}$ - to $\frac{1}{4}$ -inch thick on a section of Route 18, just east of Tallmadge. By way of comparison, natural rubber and reclaimed rubber were also used in different sections of the test strip. When spread on the highway, the new mixture forms a slightly abrasive surface believed just rough enough to permit cars to stop suddenly without skidding. According to H. L. Hubbell, State Highway engineer, this was the first time the department has tested sand-slag for road surfacing, a much higher priced material having been previously used.

The Akron test is part of a project being carried out in Ohio, Texas, and Virginia by the Rubber Development Bureau, in collaboration with English and Dutch rubber interests and the various state highway departments, to determine the practicability of rubber in road construction.

Successful Plioweld Linings

Goodyear recently completed the rubber lining of 24 acid-carrying steel tanks mounted in sixes on four 1,000-ton barges. Each large barge consumed 25,000 pounds of Plioweld rubber in the lining process. The company also rubber lined a 420,000-gallon storage tank, in Cincinnati, which is used as a terminal for distribution of hydrochloric acid by Dow Chemical Co. Approximately 11,000 pounds of natural rubber compound were used to form the Plioweld lining for this storage tank. Similarly, all interconnecting pipes and fittings on the barges, the piping system from Dow's acid plant at Freeport, Tex., to the barge-loading docks, and the piping used at the Cincinnati terminal were also lined with Plioweld.

Popular Tire Reintroduced

The reintroduction of the Marathon truck tire, popular prewar product, has been announced by Goodyear. The tire is available in 12 sizes, including the 6.00-16 through 8.25-20 sizes, which constitute about 70% of the truck tire market. The new Marathon tire has several improve-

ments over prewar quality. Tread design is wide and flat, providing a large ground contact area. The tire body is made with full plies of rayon cord which give greater resistance to heat and fatigue. Priced to give economical service to users of smaller trucks, the Marathon truck tires occupy a position in the truck line similar to the Marathon passenger-car tire announced by Goodyear about one year ago.

CALENDAR

Sept. 17. Connecticut Rubber Group. Annual Outing. Scollins Grove, Long Hill, Conn.

Sept. 18-23. American Chemical Society. Atlantic City, N. J.

Sept. 21-23. Division of Rubber Chemistry, A.C.S. Chalfonte-Haddon Hall, Atlantic City.

Sept. 21. New York Section, SPE. Hotel Shelburne, New York, N. Y.

Sept. 21. South Texas Section, SPE. Ben Milam Hotel, Houston, Tex.

Sept. 22. Southern Ohio Rubber Group.

Sept. 26-28. American Management Association. Personnel Conference. Hotel Waldorf-Astoria, New York, N. Y.

Sept. 28-30. American Society of Mechanical Engineers. Fall Meeting. Erie, Pa.

Sept. 29. Northern California Rubber Group.

Oct. 4. The Los Angeles Rubber Group.

Oct. 7. Detroit Rubber & Plastics Group, Inc. Detroit-Leland Hotel, Detroit, Mich.

Oct. 10. Upper Midwest Section, SPE.

Oct. 10-14. ASTM. National Meeting. Fairmont Hotel, San Francisco, Calif.

Oct. 11-12. ASTM Committee C-16 on Thermal Insulating Materials. Atlantic City, N. J.

Oct. 11. Buffalo Rubber Group. Hotel Westbrook, Buffalo, N. Y.

Oct. 14. Boston Rubber Group. Somerset Hotel, Boston, Mass.

Oct. 19. South Texas Section, SPE.

Oct. 19. New York and Newark Sections, SPE. Joint Meeting. Hotel Shelburne, New York, N. Y.

Oct. 21. New York Rubber Group. Henry Hudson Hotel, New York, N. Y.

Oct. 21. Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne, Ind.

Oct. 24-28. National Safety Council. Thirty-Seventh National Safety Congress and Exposition. Chicago, Ill.

Oct. 25. Washington Rubber Group.

Oct. 28. Akron Rubber Group. Fall Meeting. Mayflower Hotel, Akron, O.

Nov. 1-5. Pacific Chemical Exposition & Conference. San Francisco Civic Auditorium, San Francisco, Calif.

Nov. 4. Northern California Rubber Group. Hotel Whilcomb, San Francisco.

Nov. 14. Upper Midwest Section, SPE.

Nov. 16. South Texas Section, SPE.

Nov. 17-19. ASTM Committee D-9 on Electrical Insulating Materials. Atlantic City, N. J.

Nov. 18. Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne.

Nov. 22. Washington Rubber Group.

Nov. 27-Dec. 3. ASME. Annual Meeting. New York, N. Y.

Nov. 28-Dec. 3. Twenty-Second Exposition of Chemical Industries, Grand Central Palace, New York, N. Y.

Dec. 4-7. American Institute of Chemical Engineers. Annual Meeting. William Penn Hotel, Pittsburgh, Pa.

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To make sure of getting all these advantages in your calenders make sure the trade-mark "TIMKEN" appears on every bearing you use.

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NEWS ABOUT PEOPLE



Clifford L. Ayers

Clifford L. Ayers has been made rubber products manager of The Flintkote Co., 30 Rockefeller Plaza, New York 20, N. Y., and will head up the activities of the rubber section of the industrial products division, according to Frank H. Neher, Flintkote vice president. Mr. Ayers succeeds D. C. Cochran. For eight years prior to his association with Flintkote in 1946, Mr. Ayers was with the Goodyear Tire & Rubber Co. at Akron, being engaged primarily in chemical research on resins and paints; in development department activities as a compounder; and in work on ordinance material. He is a member of the New York, Philadelphia, and Connecticut Rubber groups; Division of Rubber Chemistry, American Chemical Society; and the American Association, Advancement of Science.

Marvin K. Larson has joined the sales staff of Douglas P. Johnstone, 2724 W. Lawrence Ave., Chicago 25, Ill., who is Chicago district representative of T. A. Desmond & Co., Inc., General Latex & Chemical Corp., and Harwick Standard Chemical Co. Mr. Larson has been in sales work for three years, selling principally liquid latex formulations and resin emulsions.

William H. Corwin last month was appointed public relations director of Taylor Instrument Co., Rochester, N. Y., according to Herbert J. Noble, executive vice president. Mr. Corwin joined the organization in 1942 as a member of the advertising department, and since 1943 he has edited the company's publication, "The Taylor Meteor," as well as prepared other company literature.

Paul B. Withstandley has been named advertising manager for Cameron Machine Co., 61 Poplar St., Brooklyn, N. Y., manufacturer of slitting and rewinding machines for the paper and textile industries. Prior to joining Cameron, Mr. Withstandley did public relations and promotional work for Bristol-Myers Co. He succeeds **Harold Overacker**, who will handle export sales for Cameron.



Cather P. Louthan

Cather P. Louthan has been added to the technical service staff of Godfrey L. Cabot, Inc., carbon black manufacturers, 77 Franklin St., Boston 10, Mass. He will headquarter at Cabot's Akron, O., branch office, act as technical representative for the company and will be in contact with rubber manufacturers throughout the United States and Canada. Shortly after graduating from the University of Colorado in 1937, Mr. Louthan joined the Gates Rubber Co., Dever, Colo., where he served successively in the control and textile laboratories and later became manager of the rubber testing laboratory. After working on special compounding problems and evaluation of new materials for several years, he was named compounding manager for tires, tubes, belts, and molded rubber goods. In recent years Mr. Louthan has been closely associated with a group active in the development and application of "cold rubber" in tires.

Miss Helen F. Tucker, of Rohm & Haas Co., Philadelphia, Pa., recently was elected treasurer of the Philadelphia Section, American Chemical Society.

Ray Nason has been transferred by Pioneer Latex & Chemical Co., Inc., Lincoln Blvd., Middlesex, N. J., from its Philadelphia office to Rome, Ga., as southern representative. Mr. Nason will operate out of the newly opened Pioneer, warehouse in Dalton, Ga.

Tom K. Smith, Jr., has been appointed, effective October 1, manager of plasticizers and resins sales for the organic division of Monsanto Chemical Co., St. Louis, Mo. Mr. Smith was assistant branch manager of the phosphate division in charge of the Cincinnati, O., branch of the division's Cleveland office since December, 1947, and has been with the company since 1937 except for his war service. He replaces Seth U. Shorey, who has been made sales manager for organic and phosphate division products for the Merrimac Division at Boston, Mass.

WEST

New Name for an Old Company

Because of expansion of business interests and a constantly increasing variety of products, the manufacturing firm, well known for 38 years as The Tamms Silica Co., has incorporated under the new name of Tamms Industries, Inc. The management and the board of directors felt that this name better signifies the wider range of manufacturing activities in which the company is engaged today. General offices will remain at 228 N. LaSalle St., Chicago, Ill.

Names Sales Agents

Golden Bear Oil Co., 325 W. Eighth St., Los Angeles 14, Calif., has appointed as its agent to the rubber industry, Akron Chemical Co., Akron, O., to cover Ohio, Indiana, Michigan, Alabama, Oklahoma, and Tennessee.

Charles M. Baldwin has been appointed Midwest agent for Golden Bear Oil Co. Mr. Baldwin, who is also the Chicago representative of United Carbon Co., will handle the Golden Bear products over an area including Denver, Colo., Natchez, Miss., and Des Moines, Iowa.

H. C. Sparhawk has been added to the sales staff of the Chicago, Ill., office (120 S. La Salle St.) of L. Albert & Son, supplier of new and guaranteed rebuilt machinery for the rubber and plastics industries, with main offices at Whitehead Rd., Trenton, N. J.

Milton George Lucke recently joined Pioneer Rubber Mills, Pittsburg, Calif., as superintendent of its hose department. Mr. Lucke has been identified with the mechanical rubber goods industry since 1928, and during the past two decades his activities have included both executive supervision of hose manufacturing as well as the technical development of industrial rubber products.

OBITUARY

Leo E. Levey

LEO EDWIN LEVEY, general sales manager of Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., Canada, died August 10 after a short illness. He had been with the company since 1911 and held various positions in sales, including assistant sales manager, mechanical division, and sales manager of the automotive tire and accessories division. He became general sales manager in 1947.

Mr. Levey was born in Schenectady, N. Y., 59 years ago and received his education there.

He belonged to the Knights of Columbus, Empire Club, Toronto Board of Trade, and many other associations.

Surviving are the widow, a sister, and a brother.

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The versatile accelerator

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Good acceleration for GR-S, GR-A, rubber and reclaim.

Produces cures under a wide variety of conditions.

Provides high tensile — high modulus.

As much or little delayed action as desired.

Clean, sharp molding. Excellent aging.

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Santocure is available for immediate shipment in any quantity. For detailed information and samples, write to MONSANTO CHEMICAL COMPANY, Rubber Service Department, 920 Brown Street, Akron 11, Ohio. Use the convenient coupon if you prefer.

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Laurence D. Ackerman

LAURENCE DAY ACKERMAN, technical superintendent of Converse Rubber Co., Malden, Mass., died on August 3 from a cerebral hemorrhage. Services were held on August 6, followed by burial at Homeland Cemetery, Bristol, N. H.

Mr. Ackerman was born in Bristol on August 8, 1886. He was graduated from Tilton School in June, 1905, and from New Hampshire University in June, 1909, with a B.S. degree in chemical engineering.

Following graduation he joined the Carnegie Steel Co., Sharon, Pa. Then in 1911 he became associated with Hood Rubber Co., Watertown, Mass., as assistant chemist and remained with them until 1914 when he became chief chemist of Hodgman Rubber Co., Tuckahoe, N. Y. In 1915 he joined the Beacon Falls Rubber Shoe Co., Beacon Falls, Conn., as chief chemist and retained that position until 1918 when he began his long association with Converse Rubber.

A member of the Masons, Union Lodge of Masons No. 79, Mr. Ackerman, also belonged to the Boston and New York Rubber groups, the American Chemical Society, the American Air Mail Society, the Suburban Stamp & Curio Club, the Annawan Fellowship Club of West Haven, Conn., and the Malden Stamp and the Malden Square & Compass clubs.

The deceased is survived by his widow, three daughters, two grandchildren, and a sister.

FINANCIAL

American Cyanamid Co., New York, N. Y., and wholly owned subsidiaries. First six months, 1949: consolidated net income, \$6,407,248, equal to \$2.09 each on 2,737,686 common shares, compared with \$5,755,963, or \$1.85 a share, in last year's half; net sales, \$113,659,005, against \$114,208,871.

American Zinc, Lead & Smelting Co., Columbus, O., and wholly owned subsidiaries. First six months, 1949; net profit, \$851,668, equal to \$1.16 a common share, against \$479,842, or 46¢ a share, in the corresponding months last year; net sales, \$18,574,165, against \$21,147,387.

Baldwin Locomotive Works, Philadelphia Pa., and wholly owned subsidiaries. Six months to June 30: net profit, \$1,829,627, equal to 74¢ a common share, against \$1,618,118, or 65¢ a share, in the 1948 period; sales, \$68,032,019, against \$61,711,159.

Borg-Warner Corp., Chicago, Ill., and subsidiaries. First half, 1949: net profit, \$10,889,051, equal to \$4.52 each on 2,336,740 common shares, compared with \$14,587,832, or \$6.09 a share, in last year's half; net sales, \$146,028,940, against \$161,877,865; income taxes, \$6,658,677, against \$8,924,217.

Brown Rubber Co., Inc., Lafayette, Ind. June half, 1949; net profit, \$700,657, equal to \$2.79 a share, against \$428,110, or \$1.70 a share, a year earlier.

Canada Wire & Cable Co., Ltd., Leaside, Ont. Six months to June 30: net income, \$577,000, equal to \$3.43 a Class B share, contrasted with \$420,000, or \$2.39 a share, in the corresponding period of 1948.

Philip Carey Mfg. Co., Cincinnati, O., and subsidiaries. First half, 1949: net earnings, \$1,042,510, equal to \$1.25 a common share against \$1,753,035, or \$2.14 a share, in the first half of 1948.

Columbian Carbon Co., New York, N. Y., and subsidiaries. June half, 1949; net profit, \$3,618,092, equal to \$2.24 each on 1,612,218 capital shares, contrasted with \$3,509,540, or \$2.18 a share, in the corresponding half last year; sales, \$19,238,186, against \$20,961,018; federal tax provision, \$1,520,000, against \$1,600,000.

Cooper Tire & Rubber Co., Findlay, O. First half, 1949: net loss, \$93,053; net sales, \$2,891,172.

Crown Cork & Seal Co., Inc., Baltimore, Md., and wholly owned domestic subsidiaries. Six months to June 30: net income, \$1,002,585, equal to 60¢ each on 1,207,790 common shares, contrasted with \$2,841,051 or \$2.12 a share, in last year's half; net sales, \$40,519,731, against \$47,434,456; provision for federal taxes, \$655,025, against \$1,823,145.

Crown Cork International Corp., Baltimore, Md., and wholly owned domestic subsidiary. Initial half, 1949: net profit, \$211,797, equal to \$1.13 a share on Class A stock against \$235,756, or \$1.25 a share, in the '48 half.

DeVilbiss Co., Toledo, O., and wholly owned subsidiary. Initial half, 1949: net income, \$211,743, equal to 70¢ each on 300,000 common shares, compared with \$327,025, or \$1.09 a share, in the like period last year; federal tax provisions, \$176,000, against \$228,700.

Dewey & Almy Chemical Co., Cambridge, Mass. First half, 1949: earnings, \$203,789, equal to 64¢ a share, against \$322,258, or \$1.01 a share, in the 1948 period; net sales, \$7,602,191, against \$7,916,972.

Dow Chemical Co., Midland, Mich., and subsidiaries. Year ended May 31, 1949: net income, \$25,260,473, equal to \$4.44 each on 5,126,024 common shares, contrasted with \$21,066,646, or \$3.72 each on 4,994,824 shares, in the preceding fiscal year; sales, \$200,370,952, against \$170,690,037.

E. I. du Pont de Nemours & Co., Inc., Wilmington Del., and wholly owned subsidiaries. First half, 1948: net income, \$86,806,495, equal to \$1.82 a common share, against \$62,611,127 or \$1.28 a share, in last year's half; net sales, \$498,337,831, against \$457,061,050.

General Motors Corp., Detroit, Mich. First six month, 1949: net income, \$303,678,643, equal to \$0.76 each on 43,976,036 common shares, against \$206,763,672, or \$4.55 a share, a year earlier; net sales, \$2,877,674,126, against \$2,234,705,927.

Flintkote Co., New York, N. Y., and subsidiaries. Twenty-eight weeks to July 16: net income, \$2,346,354, equal to \$1.71 each on 1,257,935 common shares, contrasted with \$4,033,074, or \$3.04 a share, a year earlier; net sales, \$33,505,953, against \$42,840,923.

General Cable Corp., New York, N. Y. Six months to June 30: net profit, \$1,159,905, equal to 41¢ each on 1,917,646 common shares, contrasted with \$2,180,047, or 94¢ each on 1,905,814 shares, in the preceding year's half; federal tax provision, \$715,000, against \$1,335,000.

General Tire & Rubber Co., Akron, O. First half, 1949: net income, \$474,758, equal to 41¢ a share, contrasted with \$1,713,367, or \$2.46 a share, in last year's half; sales for the five months ending May 31, \$45,161,156, against \$46,786,000 in the same months of 1948.

B. F. Goodrich Co., Akron, O., and subsidiaries. First six months, 1949: net profit, \$8,909,635, equal to \$6.02 each on 1,308,320 common shares, compared with \$11,023,446, or \$7.64 a share, in last year's half; net sales, \$192,149,550, against \$197,688,828; income tax provision, \$7,334,000, against \$8,587,000; reserve for contingencies, \$2,000,000, unchanged.

Goodyear Tire & Rubber Co., Akron, O., and subsidiaries. Half ended June 30: net profit, \$8,133,358, equal to \$3.24 each on 2,065,411 common shares, compared with \$14,191,648, or \$6.16 a share, a year earlier; net sales, \$311,823,235, against \$346,079,544; provision for income taxes, \$8,378,352, against \$15,015,676.

Hewitt-Robins, Inc., Buffalo, N. Y. Initial half, 1949: net earnings, \$246,003, equal to 88¢ each on 278,714 capital shares, compared with \$234,718, or 84¢ a share, in the like period last year.

Byron Jackson Co., Los Angeles Calif. First half, 1949: net profit, \$895,683, or \$2.36 a share, against \$965,170, or \$2.54 a share, in the same period of 1948.

Intercontinental Rubber Co., Inc., New York, N. Y., and subsidiaries. First half, 1949: net loss, \$277,468, against net loss of \$122,708 in the first half of 1948.

Johns-Manville Corp., New York, N. Y., and subsidiaries. Six months to June 30: net profit, \$5,765,600, equal to \$1.94 a common share, against \$5,007,913, or \$1.89 a share, in the 1948 half; sales, \$76,180,959, against \$77,458,919.

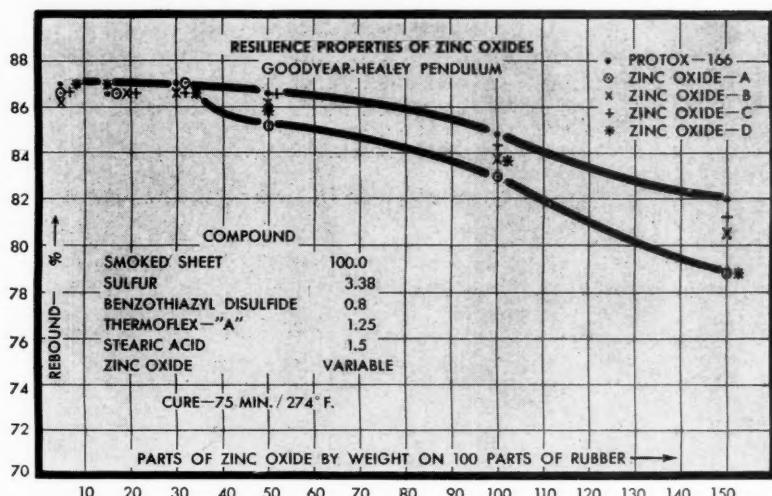
Koppers Co., Inc., Pittsburgh, Pa. Half ended June 30: net income, \$3,919,928, equal to \$2.24 each on 1,617,125 common shares, contrasted with \$3,591,669, or \$2.92 each on 1,125,825 shares, in the 1948 half; net sales, \$101,456,187, against \$90,713,989.

Glenn L. Martin Co., Baltimore, Md. Initial six months, 1949: net profit, \$976,974, equal to 86¢ each on 1,134,299 shares, contrasted with net loss of \$719,034 last year.

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Protox-166 is outstanding among Zinc Oxides for its good rebound properties. The higher resilience it imparts to compounds is reflected in lower hysteresis loss, less heat generation, better performance and longer service life of rubber products.

Protox-166 provides compounds with higher rebound than other oxides, primarily because its propionic acid treatment results in superior dispersion and internal lubrication. The higher the loading, the greater the resiliency advantage for **Protox-166** compared with a range of representative untreated Zinc Oxides, as shown in the chart. Even 150 parts of **Protox-166** on 100 parts of natural rubber provides a resilience within 5% of a "pure gum" compound.

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PROTOX-166 GIVES YOU ALL THESE ADVANTAGES

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SPEEDS MIXING

Permits larger master batches
Faster incorporation
Better dispersion
Lower power consumption

INHIBITS SCORCH

IMPROVES TUBING AND CALENDERING

Provides plasticizing effect
Imparts smoother tubing
Reduces die swell
Cuts calender shrinkage
Gives cooler running stocks

HELPS REINFORCEMENT

Improves tensiles
Raises tear resistance
Increases modulus
Steps up resilience

For further details, see "The Activator," Vol. 9, No. 1.

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Johnson & Johnson, New Brunswick, N. J., and domestic subsidiaries. First six months, 1949: net income, \$4,335,405, equal to \$2.18 each on 1,889,917 common shares, contrasted with \$5,398,941, or \$2.90 each on 1,792,720 shares, in the corresponding period of 1948; net sales, \$66,923,453, against \$66,878,256.

Lee Rubber & Tire Corp., Conshohocken, Pa., and subsidiaries. Six months to April 30: net profit, \$743,963, equal to \$2.93 each on 253,584 capital shares, compared with \$923,640, or \$3.64 a share, a year earlier; net sales \$15,503,592, against \$16,665,913; income taxes, \$510,800, against \$652,000.

Mailman Corp., Ltd., formerly British Rubber Co. of Canada, Ltd., Montreal, P. Q., Canada, and subsidiaries. Year ended April 30, 1949: net profit, \$856,560, equal to \$3.08 a common share; sales, more than \$14,000,000; provision for depreciation, \$193,212; income taxes, \$544,959; current assets, \$6,575,336, current liabilities, \$2,977,922.

Marine Magnesium Products Corp., South San Francisco, Calif. Six months ended June 30: net profit, \$101,664, equal to 31¢ each on 329,949 shares, compared with \$84,673, or 85¢ each on 100,000 shares, in the '48 half.

Midwest Rubber Reclaiming Co., East St. Louis, Ill. Six months ended April 30: net profit, \$217,383, equal to 63¢ each on 279,990 common shares; net sales, \$2,153,355.

Minnesota Mining & Mfg. Co., St. Paul, Minn., and subsidiaries. Half ended June 30: net profit, \$6,330,227, equal to \$3.11 each on 1,972,845 common shares, compared with \$5,724,260, or \$2.83 each on 1,951,530 common shares, in the like period last year; net sales, \$54,552,850, against \$51,639,752.

National Automotive Fibres, Inc., Trenton, N. J., and wholly owned subsidiary. First half, 1949: net profit, \$2,207,711, equal to \$2.31 each on 953,779 capital shares, against \$1,160,564, or \$1.22 a share, in the 1948 period; net sales, \$30,885,611, against \$22,907,331.

National Lead Co., New York, N. Y. Half ended June 30: net income, \$6,391,128, equal to \$1.64 a common share, compared with \$6,512,990, or \$1.77 a share, in last year's half; net sales, \$127,259,564, against \$148,121,628.

O'Sullivan Rubber Corp., Winchester, Va. First six months, 1949: net income, \$14,555, equal to 42¢ each on 35,000 preferred shares, contrasted with \$26,547, or 3¢ each on 275,000 common shares, in the corresponding period of 1948: net sales, \$1,692,254, against \$1,372,458.

Phelps Dodge Corp., New York, N. Y., and subsidiaries. Six months to June 30: consolidated net income, \$17,954,905, equal to \$3.54 each on 5,071,260 capital shares, compared with \$24,685,118, or \$4.87 a share, a year earlier; sales, \$106,222,596, against \$119,615,157.

Dividends Declared

COMPANY	STOCK	RATE	PAYABLE	STOCK OF RECORD
Belden Mfg. Co.	Com.	\$0.20 red.	Sept. 1	Aug. 17
Boston Woven Hose & Rubber Co.	Com.	0.50 q.	Aug. 25	Aug. 15
Brown Rubber Co., Inc.	Com.	0.25 q.	Sept. 1	Aug. 18
Brunswick-Balke-Collender Co.	Pfd.	0.25 q.	Sept. 15	Sept. 1
Canada Wire & Cable Co., Ltd.	'A'	1.25 q.	Oct. 1	Sept. 20
	'B'	1.00 q.	Sept. 15	Aug. 31
Collyer Insulated Wire Co., Inc.	Com.	0.50 res.	Sept. 15	July 25
Crown Cork & Seal Co., Inc.	Com.	0.25 q.	Aug. 27	Aug. 9
Dewey & Almy Chemical Co.	Pfd.	0.50 q.	Sept. 15	Aug. 23
Electric Hose & Rubber Co.	Com.	0.15	Aug. 8	July 30
Firestone Tire & Rubber Co.	Com.	0.30 q.	Aug. 19	Aug. 12
Flintkote Co.	4 1/2% Pfd.	1.12 1/2 q.	Sept. 1	Aug. 15
Garlock Packing Co.	Com.	0.50 q.	Sept. 10	Aug. 26
General Electric, Ltd. (Great Britain)	Pfd.	1.00 q.	Sept. 15	Sept. 1
	Com.	0.25 q.	Sept. 30	Sept. 16
General Tire & Rubber Co.	Ord. Reg.	10% ^c	Oct. 26	Sept. 7
Goodrich, B. F., Co.	ADR Ord. Reg.	10% ^c	Oct. 14	Sept. 7
Hewitt-Robins, Inc.	Com.	0.25 q.	Aug. 31	Aug. 19
Johns-Manville Corp.	Com.	1.00	Sept. 30	Sept. 15
Johnson & Johnson	Pfd.	1.25 q.	Sept. 30	Sept. 15
Kleinert, I. B., Rubber Co.	Com.	0.25 q.	Sept. 15	Aug. 29
Midwest Rubber Reclaiming Co.	Pfd.	0.56 1/4 q.	Oct. 1	Sept. 14
Minnesota Mining & Mfg. Co.	Com.	0.70 incr.	Sept. 12	Aug. 26
Raybestos-Manhattan, Inc.	Pfd.	1.00	Sept. 12	Aug. 26
Spalding, A. G., & Bros., Inc.	Com.	0.37 1/2 q.	Sept. 12	Aug. 26
United Elastic Corp.	Com.	0.25 q.	Sept. 15	Sept. 8
United States Rubber Co.	Com.	0.75 q.	Sept. 9	Aug. 16
	Pfd.	0.50 red.	Sept. 10	Aug. 22
White, S. S., Dental Mfg. Co.	Com.	2.00	Sept. 10	Aug. 22
	Com.	0.37 1/2	Aug. 13	July 29

National Erie Corp., Erie, Pa. For 1948: net income, \$490,890, equal to \$2.20 a common share, against \$391,241, or \$1.74 a share, in 1947.

New Jersey Zinc Co., New York, N. Y. Six months ended June 30: net profit, \$3,223,638, equal to \$1.65 a share, against \$4,176,095, or \$2.13 a share, in the like period last year.

Phillips Petroleum Co., Bartlesville, Okla. Six months to June 30: consolidated net income, \$21,953,129, equal to \$3.63 each on 6,047,139 common shares, compared with \$36,481,282 or \$6.03 a share, in the corresponding half of 1948.

Pittsburgh Plate Glass Co., Pittsburgh, Pa. Initial six months, 1949: net profit, \$15,570,288, equal to \$1.72 a share, compared with \$14,200,693, or \$1.59 a share, in the first half of 1948: sales, \$140,352,496, against \$133,045,128.

St. Joseph Lead Co., New York, N. Y. Initial six months, 1949: consolidated net income, \$4,852,390, against \$5,948,539, a year earlier; net sales \$43,546,168, against \$40,903,469.

Seiberling Rubber Co., Akron, O. Initial half, 1949: net loss, \$247,525, compared with net earnings of \$299,732, equal to 59¢ a share, in last year's half; net sales, \$11,969,831, against \$14,138,712.

Skelly Oil Co., Kansas City, Mo. Six months ended June 30: net income, \$13,856,208, equal to \$11.66 each on 1,187,422 common shares, compared with \$18,398,562, or \$18.74 each on 981,341 common shares.

Socony-Vacuum Oil Co., Inc., New York, N. Y. Six months to June 30: consolidated net earnings, \$47,000,000, equal to \$1.45 a common share, against \$71,000,000, or \$2.88 a share, in the like period last year.

Sun Oil Co., Philadelphia, Pa., and subsidiaries. First six months, 1949: net profit, \$12,822,993, equal to \$2.56 each on 4,932,380 common shares, against \$22,799,153, or \$5.01 each on 4,508,765 common shares, in the 1949 half; reserve for depreciation, \$3,250,000, against \$3,500,000.

Union Asbestos & Rubber Co., Chicago, Ill. Half ended June 30: net profit, \$594,017, equal to \$1.20 each on 495,376 common shares, compared with \$767,226, or \$1.55 a share, in last year's half; net sales, \$5,387,034, against \$6,853,272; income tax provision, \$364,075, against \$470,236.

Union Carbide & Carbon Corp., New York, N. Y., and subsidiaries. Six months ended June 30: net income, \$42,126,139, equal to \$1.46 each on 28,807,314 capital shares outstanding, contrasted with \$47,061,574, or \$1.63 a share, in the similar months of the preceding year; gross sales, \$288,748,244, against \$302,086,264.

United Carbon Co., Charleston, W. Va., and subsidiaries. First half, 1949: net profit, \$1,353,303, equal to \$1.70 each on 795,770 capital shares, compared with \$1,568,800, or \$1.97 a share, in last year's period; income tax reserves, \$502,000, against \$1,120,000.

United Engineering & Foundry Co., Pittsburgh, Pa., and subsidiary. Six months ended June 30: net profit, \$2,565,507, equal to \$3.09 each on 820,746 common shares, contrasted with \$1,934,435, or \$2.32 a share, in the first half of 1948; net sales, \$32,124,567, against \$23,894,056; reserve for income taxes \$1,687,927, against \$1,271,759.

S. S. White Dental Mfg. Co., Philadelphia Pa., and subsidiaries. Initial half, 1949: net profit, \$566,181, equal to \$627,362, or \$2.09 a share, in the 1948 half; net sales, \$9,833,304, against \$9,528,505.

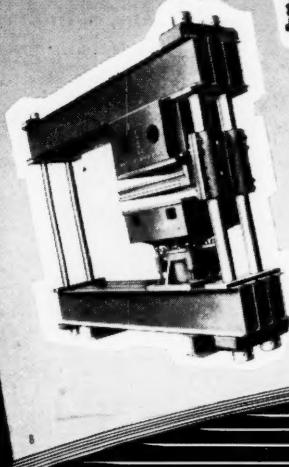
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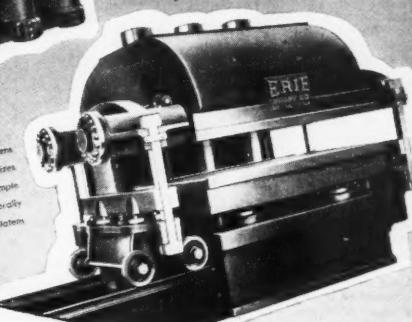
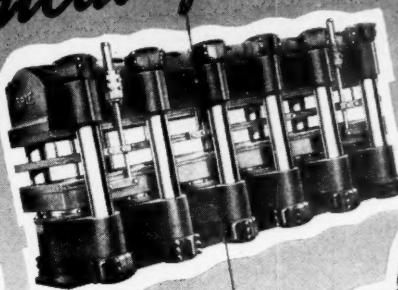
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Mechanical Goods PRESSES

A press for making bolts, of the two-opening type. This design eliminates counterbore bores and provides rigidity through the use of very heavy rolled steel sections. This particular machine has platens 40" x 37" and a ton capacity. The platen rollers and the cylinder mechanism are not shown in the photograph.



A 4200-ton two-opening press for flat stock, with platens 52" wide and 18" long. Platens of this type are built in sizes up to 76" wide x 36" long. The press shown has simple hydraulic breaker cylinders. Large machines are generally built with bell crank equalizers, designed to hold the platens parallel.



Another type of press for making bolts, a 1232-ton eccentric bolt press with platens 50" x 82". This press is complete with clamps and stretchers; the maximum clamping force is 200 tons and the minimum stretch force 150 tons. The platen drilling is synchronized so that any part of the platen can be heated or cooled as desired. This press was designed and machined so that when under load the entire platen areas remain parallel within very limited tolerances.

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APPLICATION

United States

2,474,852. **Fender Skirt of Resilient, Flexible Synthetic Plastic Sheet.** G. A. Lyon, Allenhurst, N. J., assignor to Lyon Inc., Detroit, Mich.

2,474,954. **Overshoe.** A. R. Nelson, New York, N. Y.

2,475,071. **Pessary.** T. Young, assignor to Purex Products, Inc., both of New York, N. Y.

2,475,193. **Electrically Conducting Pneumatic Tire.** J. L. Reynolds, Richmond, Va.

2,475,532. **Athletic Supporter.** G. S. Van Voorhis, assignor to United Elastic Corp., both of Easthampton, Mass.

2,475,839. **Meteorological Balloon.** D. C. Jaibert, Belmont, assignor to Dewey & Almy Chemical Co., North Cambridge, both in Mass.

2,475,859. **Footwear Splash Guard.** H. W. Stroh, Kitchener, Ont., Canada, assignor to B. F. Goodrich Co., New York, N. Y.

2,476,021. **Packing.** C. F. Bender, assignor to Wingfoot Corp., both of Akron, O.

2,476,201. **Sponge Rubber Insert for Toothbrush Head.** A. E. Ligoure, New Orleans, La.

2,476,226. **In a Saddle Mounting for Bicycles, Layers of Live Resilient Material Bonded to the Seat Frame and the Support Frame.** F. W. Schwinn, Chicago, Ill.

2,476,324. **A Sealing Assembly Including a Sealing Ring of Rubber-Like Material Having a Radial Annular Portion and an Axially Extending Frusto-Conical Lip Portion Integral with the Annular Portions.** G. F. P. Reich, Bremerton, Wash.

2,476,375. **Urinary Apparatus.** J. H. Kent, Johnstown, Pa.

2,476,455. **In a Method of Assembling an Electrical Capacitor, the Use of a Filling Composition Including a Butyl Methacrylate Polymer Dissolved in a Liquid Butyl Methacrylate or Styrene.** R. J. Roush, Niagara Falls, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,476,459. **Resilient Bodies of Rubber-Like Material in the Shoes in a Track for a Self-Laying Track-Type Vehicle.** C. O. Siemmons, South Bend, Ind., assignor to B. F. Goodrich Co., New York, N. Y.

2,476,460. **Friction Drive Track for a Self-Laying Track-Type Vehicle.** R. W. Smith, Copley, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,476,505. **Removable Rubber Lining for Ball Mills.** F. McIntyre, assignor to Wilkinson Rubber Linatex, Ltd., both of London, England.

2,476,565. **Knee Pad of Water-Imperious Sheet Material Folded to Form a Pocket to Receive a Removable Cushion and Held in Shape by a Rubber Band.** F. Russell, Kansas City, Mo.

2,476,627. **Linings for Container Closures Formed from a Paper Base Having a Coating Produced Chiefly from Vinyl Resin Material, and a Top Coating Including Polyethylene and a Butylated Crea-Formaldehyde Resinous Material.** J. G. Rote, Jr., Rahway, N. J., assignor to Sun Chemical Corp., New York, N. Y.

2,476,733. **Weedless Rubber Fish Bait.** E. L. Jacobs, Vicksburg, Mich.

2,476,786. **Tire Tread Including Separately Formed Composite Strips of Permanently United Rubber and Rubberized Fabric, Compactly Arranged Side by Side on the Tire.** L. F. Wallis, Lower Hutt, Wellington, New Zealand.

Dominion of Canada

457,632. **Resilient Mounting for Vehicle Bodies, Etc.** J. M. Buchan, assignor to Andre Rubber Co., Ltd., both of Surbiton, Surrey, England.

457,694. **Casing for a Self-Sealing Fuel Cell, Including Layers of Textile Fabric Partially Impregnated and Cemented to Each Other with a Hard Adhesive.** A. M. Howald and L. S. Meyer, assignors to Libbey-Owens-Ford Glass Co., all of Toledo, O., U.S.A.

457,813. **Felt Hat Having Incorporated Only in the Brim Vinyl Resin Fibers.** H. Shrager and B. Shnberg, both of Westerly, R. I., assignors to American Felt Co., Greenville, Conn., both in the U.S.A.

457,898. **Mattress Having an Inner Construction Consisting of Two Adjacent Units,**

Including a Molded Body of Yieldable Elastic Material, Provided with Sealed Compartments, Each of Which Encloses a Spring. M. Marsack, assignor to Marsack Patents Corp., both of Milwaukee, Wis., U.S.A.

458,091. **Seat Suspension.** A. S. Krotz, Akron, and R. R. Cowden, Cuyahoga Falls, both in O., assignors to B. F. Goodrich Co., New York, N. Y., U.S.A.

458,147. **Nursing Unit.** W. G. Canham, St. Albans, and A. H. Ostrin and L. Borstein, both of Charleston, both in W. Va., U.S.A.

458,213. **Oil Sealing Ring.** T. H. Winkeljohn, Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O., both in the U.S.A.

458,230. **Improved Method of Making Plastic Surfaced Panels.** W. W. Cross, assignor to Paper Patents Co., both of Neenah, Wis., U.S.A.

United Kingdom

624,764. **Pressure-Sensitive Adhesive Tape.** Minnesota Mining & Mfg. Co.

624,945. **Bathing Caps.** W. S. Freeman.

624,958. **Syringes.** E. M. Wender.

625,129. **Inflatable Dinghies and Like Craft.**

R. F. D. Co., Ltd., and H. M. L. and R. L. Williams, legal representatives of P. W. L. Williams, deceased.

625,289. **Life Jackets, Life Preservers, Etc.**

F. Tveten.

625,351. **Wrapping Material.** Wingfoot Corp.

625,497. **Collapsible Buoyant Decoy.** J. L. Feusner.

625,767. **Pipe Couplings.** British Tire & Rubber Co., Ltd., W. N. Evans, and J. Birkbeck.

PROCESS

United States

2,475,141. **Continuous Process of Concentrating a Guayule Rubber Dispersion by Centrifuging.** E. P. Jones, Salinas, Calif., assignor to The United States, as represented by the Secretary of Agriculture.

2,475,191. **Latex Foam.** J. T. Marvin, Dayton, and G. H. McFadden, Columbus, both in O.; Marvin, assignor to General Motors Corp., Detroit, Mich.; and McFadden, assignor to Ohio State Research Foundation, Columbus.

2,476,140. **Making Film in Tubular Form from a Normally Crystalline Vinylidene Chloride Polymer.** K. G. Francis, Bay City, assignor to Dow Chemical Co., Midland, both in Mich.

2,476,146. **Skid-Resisting Treads.** P. E. Hawkinson, assignor to Paul E. Hawkinson Co., both of Minneapolis, Minn.

2,476,151. **Brake Drums.** F. H. Le Jeune, Jackson, Mich., assignor by mesne assignments, to B. F. Goodrich Co., New York, N. Y.

2,476,588. **Lined Brake Shoes.** H. R. Dreher, Huntington, Ind., assignor to General Motors Corp., Detroit, Mich.

2,476,631. **Making Coats from a Liquid Latex.** J. Schumann, Philadelphia, Pa.

2,476,817. **Sectional Curing Bag.** J. E. Charman, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,827. **Molding Sponge Rubber.** L. A. Wohler, Akron, O., and H. W. Greenup, Barrington, R. I., assignors to Firestone Tire & Rubber Co., Akron.

2,476,830. **Forming Fine Filaments from Vinyl Resins.** G. A. Spencer, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,884. **Forming a Pneumatic Tire Casting.** C. E. Maynard, assignor to Pro-Phy-Lac-Tic Brush Co., both of Florence, Mass.

2,477,267. **Electrically Conductive Sealing Gaskets.** H. M. Robinson, Walton, assignor to Bendix Aviation Corp., New York, both in N. Y.

Dominion of Canada

457,682. **Belt.** R. R. Riel and R. A. Clausen, both of Wabash, Ind., assignors to General Tire & Rubber Co., Akron, O., both in the U.S.A.

457,846. **Stable Vinyl Coating on Metal Surfaces.** E. C. Pfeffer, Jr., Troy, assignor to Continental Can Co., Inc., New York, both in N. Y., U.S.A.

457,866. **Expanded Thermoplastic Resinous Products.** A. Cooper and D. E. Partington,

assignors to Expanded Rubber Co., Ltd., all of Croydon, Surrey, England.

457,972. **Synthetic Resin Insulated Electrical Conductors.** C. J. Krogel, Cranford, N. J., assignor to Western Electric Co., Inc., New York, N. Y., both in the U.S.A.

457,986. **Prerotated Airplane Tire.** W. E. Shively, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

458,093. **Manufacturing a Comb from Mullen or Plastic Material.** F. C. R. C. and E. C. Monnat, all of Barcelona, Spain.

458,081. **Sectional Curing Bag.** R. F. Wilson, San Gabriel, Calif., assignor to Firestone Tire & Rubber Co., Akron, O., both in the U.S.A.

458,215. **Applying to Paper Extremely Thin Coatings of Chlorinated Rubber.** C. D. Enders, assignor to Hercules Powder Co., both of Wilmington, Del., U.S.A.

458,230. **Improved Method of Making Plastic Surfaced Panels.** W. W. Cross, assignor to Paper Patents Co., both of Neenah, Wis., U.S.A.

United Kingdom

624,318. **Molded Rubber Articles.** W. Binns.

624,631. **Joining Polyvinyl Sheets.** Greenwich Leathercloth Co., Ltd., and R. H. Czeckowitzka.

624,903. **Injection Molding of Plastic Materials.** E. S. Long.

625,026. **Manufacture of Films for Wrapping and Other Purposes.** Firestone Tire & Rubber Co.

625,116. **Electrically Heated Protective Covering.** B. F. Goodrich Co.

625,584. **Rubber Pistons.** Hungarian Rubber Goods Factory, Ltd.

625,772. **Retreading Tire Covers.** Auto Tire Services, Ltd., and J. H. F. Kent.

CHEMICAL

United States

2,474,807. **Synthetic Rubber Including a Butadiene-1,3, a Material Having a Single $\text{CH}_2=\text{C}=\text{CH}_2$ Group, and a Small Amount of a Compound of the Formula**



Where A is Phenylene, Naphthalene, or Diphenylene, and R is Hydrogen, Methyl, or Ethyl. D. L. Schoene, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,474,808. **Preparing Vinyl Sulfones by Subjecting a Beta-Hydroxyethyl Sulfone or an Alkanoic Ester thereof to Heat Decomposition between 150° and 600°.** C. D. L. Schoene, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,474,838. **Reacting a Saturated Aliphatic Beta-Lactone with Thiourea and Recovering the Beta-Isothiourea Saturated Aliphatic Monocarboxylic Acid thus Formed.** T. L. Gresham and F. W. Shaver, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,474,839. **New Chemical Compounds Selected from the Class of Beta-Dithiocarbamyl Propionic Acid and Its Salts.** T. L. Gresham, and J. E. Jansen, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,474,859. **Ethylene Polysulfide Polymer Lubricant for a Plug Valve.** B. A. Perkins, San Lorenzo, Calif., assignor to Rockwell Mfg. Co., Pittsburgh, Pa.

2,474,896-897. **Film-Forming Compositions of Vinylidene Chloride-Acrylonitrile Copolymers Containing an Aromatic or Halogenated Hydrocarbon as a Gel Retardant.** P. M. Hauser, Kenmore, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,474,901-903. **In the Production of the Solid Adduct of Isobutylene and a Material from the Group of Nitrosyl Chloride and Nitrosyl Bromide, the Improvement of Carrying out the Reaction in the Presence of Either Activated Carbon, Activated Bauxite, or Activated Clay.** A. J. Martin, East Orange, N. J., assignor to Allied Chemical & Dye Corp., New York, N. Y.

2,475,002. **Stabilization of a Polymer Produced by Curing with Benzoyl Peroxide a Dihydroxy Aliphatic Hydrocarbon-Dicarboxy Hydrocarbon Polyester by Treatment with Ethyl Alcohol.** B. S. Biggs, Summit, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

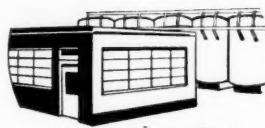
2,475,005. **Onium-Catalyzed Phenolic Resins.** J. L. Brannon, Plainfield, N. J., assignor to Bakelite Corp., a corporation of N. J.

Growing to Serve

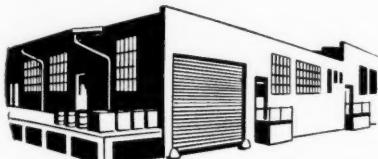
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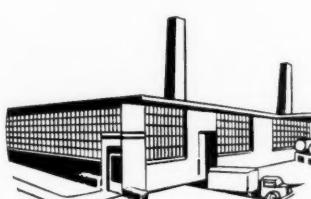
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2,475,016. Emulsion Polymerization of Vinylidene Compounds. W. L. J. de Nie, Amsterdam, Netherlands, assignor to Shell Development Co., San Francisco, Calif. 2,475,053. Treating a Butadiene-Acrylonitrile Latex with Ammonium or Substituted Ammonium Salts to Increase Particle Size, and Steam Distilling to Remove Added Volatile Salt. J. S. Rumbold, Woodbridge, Conn., assignor to United States Rubber Co., New York, N. Y.

2,475,062. Composition Including a Vinyl Chloride Polymer and Di-Allyloxyethyl Phthalate. P. O. Tawney, Passaic, N. J., assignor to United States Rubber Co., New York, N. Y.

2,475,122. Reacting Rubber with a Poly(chloromethoxyisilane of the Group of Trichlorosilane, Methylchlorosilane and Phenylchlorosilane, to Produce an Addition Product of the Rubber and the Silane. A. J. Barry and D. E. Hook, Midland, and L. DePree, Holland, assignors, by mesne assignments, to Dow Chemical Co., Midland, both in Mich.

2,475,150. Resinous Composition from Styrene and Benzaldehyde Heated in the Presence of a Peroxy Compound. D. T. Mowry, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,475,161. Copolymers of Styrene and Benzalphenolimides. H. H. Szmant, Pittsburgh, Pa., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,475,234. Polymerization of Cyclic Dimer of Butadiene-1,3 or Piperylene. A. H. Gleason and B. M. Vanderbilt, both of Westfield, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,475,273. Polyallyl Levulinate. D. E. Adelson and H. Dannenberg, Berkeley, assignors to Shell Development Co., San Francisco, both in Calif.

2,475,290. Rubber-Like Polymer of a Diene Hydrocarbon Plasticized with an Alkenyl Ether of Diglycerol. K. E. Marple, Oakland, assignor to Shell Development Co., San Francisco, both in Calif.

2,475,295. Catalytic Polymerization of Allyl Esters. E. C. Shokal, Oakland, and F. A. Bent, Berkeley, assignor to Shell Development Co., San Francisco, all in Calif.

2,475,299. Polystyrene-Type Resins Plasticized with the Lauric Acid Ester of Diethylene Glycol Monoethyl Ether. F. J. Soddy, Baton Rouge, La., assignor to United Gas Improvement Co., a corporation of Pa.

2,475,347. Polymers from Nitropolyhydroxy Alcohols and Polyamines. P. Arthur, Jr., and M. S. Racine, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,475,526. Ethylene Polymerization with Grignard-Type Compounds. M. J. Roedel, Talleysville, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,475,557. Copolymers of Vinyl Acetate and an Ester of 9,10-Dihydrostearic Acid and an Olefinic Alcohol Containing a Terminal Methylenes Group. D. Swern, Philadelphia, and G. B. Dickel, Monongahela, Pa., assignors to the United States of America, as represented by the Secretary of Agriculture.

2,475,582. Vulcanizable Rubber Composition Including as Accelerator the Reaction Product of Benzothiazyl Disulfide with a Substituted Guanidine Having the Formula Ar-G-Ar, in Which Ar and Ar Represent Mononuclear Aryl Radicals, and G the Guanidine Residue, and a Substituted Guanidine of the Formula Ar'-G-Ar" in Which Ar' and Ar" Represent Mononuclear Aryl Radicals Other Than Naphyl. A. R. Davis, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,475,626. Combustion Retarding Coating Composition Including Vinyl Acetate Vinyl Chloride Copolymer, N-Butyl Methacrylate Polymer, Tricresyl Phosphate, Triphenyl Phosphate, Zinc Oxide, Acetone, Solvent, Mineral Spirits, Inert Pigment and Penta-chlorophenol. M. Leatherman, Bel Air, Md.

2,475,628. Ethylene Polymerization Process. E. E. McSweeney, Grandview Heights, O., assignor, by mesne assignments, to Standard Oil Co., Chicago, Ill.

2,475,643. Ethylene Polymerization Process. J. E. Seibold, assignor to Standard Oil Co., both of Chicago, Ill.

2,475,648. Catalytically Polymerizing Ethylene in the Gaseous State with a Di-Peroxy-Dicarbonate Ester. G. G. Stoner, Grandview Heights, and R. L. Savage, Columbus, both in O., assignors, by mesne assignments, to Standard Oil Co., Chicago, Ill.

2,475,654. Vulcanized Copolymer of a Glycidic Drying Oil and a Diene Hydrocarbon. H. L. Gerhart, Milwaukee, Wis., assignor to Pittsburgh Plate Glass Co., Allegheny County, Pa.

2,475,731. Reaction Product of Styrene and a Fusible Polyester of a Glycol and a Mixture of Maleic Anhydride and Cyclopentadiene-maleic Adduct. G. S. Weith, Caldwell, N. J., assignor to Bakelite Corp., a corporation of N. J.

2,475,886. Sulfonated Copolymer of Styrene and Maleic Anhydride. M. T. Goebel, Rocky River, O., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,476,000. Solid Polymer of a Multiolefin Having 4 to 10 Carbon Atoms per Molecule, and a Minor Proportion of a Monoolefin Having 5 to 8 Carbon Atoms per Molecule. W. J. Sparks, Cranford, N. J., and R. M. Thomas, Baton Rouge, La., assignors to Standard Oil Development Co., a corporation of Del.

2,476,026. 2-Cyano-2,3-Diacetoxy Butanes. A. M. Clifford and J. R. Long, both of Stow, assignors to Wingfoot Corp., Akron, both in O.

2,476,027. A Rubber-Like Aqueous Emulsion Copolymer of 50-80 Parts of Butadiene-1,3 and 50-20 Parts of Tetrahydrofurfuryl Methacrylate. A. M. Clifford, Stow, assignor to Wingfoot Corp., Akron, both in O.

2,476,064. Copolymer of a Mixture of a Non-Conjugated Aliphatic Isoolefin, and Aliphatic 1,3-Conjugated Diolefin, a Vinyl Substituted Aryl Compound, and an Aliphatic Monoolefin, Prepared with a Friedel-Crafts Catalyst. B. L. Ritz, Norwood, and H. L. Johnson, Media, assignors to Sun Oil Co., Philadelphia, all in Pa.

2,476,065. Resinous Condensation Product of a Mixture of Terep, Formaldehyde, and Acrylonitrile or Methacrylonitrile. J. D. Robinson, Greenwich, Conn., assignor to Wingfoot Corp., Akron, O.

2,476,069. Delustering Copolymer Filaments. J. E. Snyder, assignor to Wingfoot Corp., both of Akron, O.

2,476,127. Preparing a Tetra-Methylol Melamine Reaction Product. H. J. West, Pittsburgh, Pa., assignor to American Cyanamid Co., New York, N. Y.

2,476,132. Organosiloxane Polymers. E. C. Britton and H. C. White, assignors to Dow Chemical Co., all of Midland, Mich.

2,476,168. Rubber-Like Reaction Product of a Polyisodide of a Radical from the Group of Ammonium, Alkali Metal, and Alkaline Earth Metal with a Chlorinated Paraffin Wax. R. V. White, Pitman, N. J., and H. L. Conrad, Camp Lee, Va., assignors to Socony-Vacuum Oil Co., Inc., a corporation of N. Y.

2,476,270. Preparation of 1,1-Dicyano Ethylene by the Pyrolysis of 1-Acetoxy-1,1-Dicyano Ethane. A. E. Ardik, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,476,341. Rubber-Like Copolymer of an Allyl Ester with a Compound from the Group of Open-Chain Conjugated Aliphatic Diene Hydrocarbons and Monohalogenated Hydrocarbons, and a Mixture Containing Such a Diene and a Styrene or Acrylonitrile. K. H. Weber, assignor to Armstrong Cork Co., both of Lancaster, Pa.

2,476,347. Molding Compositions from Synthetic Resin-Impregnated Regenerated Cellulose Staple Fibers. J. A. Spandon, near Derby, England, assignor to Celanese Corp. of America, a corporation of Del.

2,476,422. Polyvinyl Chloride Composition Stabilized by a Mixture of 2-Phenyl Indole and Diphenyl Tin. R. L. Leininger, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,476,430. Aqueous Dispersion of Isobutylene-Diolefin Copolymer Containing a Dispersing Agent Including Water-Dispersible Protein and a Saponification Product of an Organic Acid Composition. E. H. Robbins, Brooklyn, assignor to Patent & Licensing Corp., New York, both in N. Y.

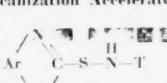
2,476,474. Preparing Polymerization Products in Granular Form by Polymerizing an Aqueous Dispersion Containing a Vinyl Halide; Dissolved in the Aqueous Medium Is a Heteropolymer of Vinyl Acetate and Maleic Acid or Maleic Anhydride. M. Baer, Chicago, Ill., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,476,606. Vinyl Fluoride Polymer Containing a Thermal Stabilizer, Glycerol Monolaurate. F. L. Johnston, Claymont, and H. J. Richter, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, both in Del.

2,476,661. Preserving Rubber by Incorporating a Secondary Aromatic Amine Antioxidant and a Compound of the Formula $(C_6H_5CH_2)_2SnR$ Where R is an Alkyl Group Having 2 to 6 Carbon Atoms. E. J. Hart, Cedar Grove, N. J., assignor to United States Rubber Co., New York, N. Y.

2,476,668. Production of Derivatives of Bromo Aliphatic Acids. M. S. Kharasch, Chicago, Ill., and E. C. Ladd, Passaic, N. J., assignors to United States Rubber Co., New York, N. Y.

2,476,688. Vulcanization Accelerator of the Compound:



Where Ar Is an Ortho-Arylene Nucleus, and T a 1,1-Dioxo-3-Thiolanyl Group. L. B.

Tewksbury, Jr., Potsdam, N. Y., assignor to United States Rubber Co., New York, N. Y.

2,476,731. Polymers and Copolymers of 2-Vinylofuran. E. A. Kern and R. K. Abbott, Jr., both of Pittsfield, Mass., assignors to General Electric Co., a corporation of N. Y.

2,476,818. Curing Rubber. E. L. Carr, Akron, O., and J. R. Rafter, Sharon, Mass., assignors to Firestone Tire & Rubber Co., Akron, O.

2,476,819. GR-S Latex Containing Carbon Black. R. E. Drama, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,821. Copolymer of Butadiene and Styrene Stabilized with a Diaryl Sulfide or a Diaryl Arsenic Sulfide. H. E. Albert, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,822. Coagulum of 1,3-Butadiene and Styrene Containing a Salt of a Primary Alkyl Monoamine to Activate the Vulcanization of the Copolymer. A. D. Miller, Cuyahoga Falls, O., assignor to Firestone Tire & Rubber Co., Akron, O.

2,476,824. Butadiene - Styrene Copolymer Tackified by a Reaction Product of an Aldehyde and a Phenol. H. E. Albert, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,829. Stabilization of Chlorine Containing Resins. C. D. Le Claire, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,832. Vinyl Chloride Resin Compositions Containing Imidazolines. R. A. Donia, Houghton, Mich., assignor to Firestone Tire & Rubber Co., Akron, O.

2,476,833. Stabilization of GR-S, Etc., with a Mixture of a Trialkylphenol and a Stannous Salt. H. E. Albert, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,836. Producing Thermoplastic Polymer of the Ester of a Beta, Gamma-Monoolefinic Monohydric Primary Alcohol of 3 to 6 Carbon Atoms and a Saturated Monocarboxylic Acid of up to 12 Carbon Atoms. R. Whetstone, Berkeley, assignor to Shell Development Co., San Francisco, both in Calif.

2,476,967. Solid Rubber Copolymer of Styrene, Butadiene, and Vinylidene Chloride from the Aqueous Dispersion whereof Smooth Films May Be Cast. E. L. Fiedler, assignor to Dow Chemical Co., both of Midland, Mich.

2,477,015. In the Vulcanization of Butadiene Elastomers, the Incorporation of a Dinitroso Compound. B. M. Sturgis, Pitman, N. J., and J. H. Trepagnier, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,477,018. Rubbery Copolymers of Normal Olefins with Diolefins. R. M. Thomas, Baton Rouge, La., and H. C. Reynolds, Belmont, Mass., assignors to Standard Oil Development Co., a corporation of Del.

2,477,218. Vinyl Ethers and Polymers thereof. H. T. Thompson, Easton, Pa., assignor to General Aniline & Film Corp., New York, N. Y.

2,477,225. Vinyl Alkyl Ether Polymers of Increased Resistance to Heat Depolymerization. A. O. Zoss, Easton, Pa., assignor to General Aniline & Film Corp., New York, N. Y.

2,477,280. Composition Including a Rubber Polymer of Isobutylene and a Multiolefin together with a Compound Having a Quinone Dioxime Nucleus as Curing Agent and a Compound Having an Aromatic Acid Radical as Scorch Preventing Agent. F. P. Baldwin, Pluckemin, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,477,316. Readily Extrudable Homogeneous Thermoplastic Mixture With Valuable Physical and Electrical Properties Obtained from Polyisobutylene, and a Copolymer of Styrene and a Conjugated Diolefin. W. J. Sparks, A. H. Gleason, and P. K. Frolich, all of Westfield, N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

2,477,336. Fabric Capable of Withstanding Steam under Pressure up to 70 Pounds per Square Inch, Including a Cotton Fabric Base and a Coating of a Natural or Synthetic Rubber Composition Including a Vulcanizing Agent and Curing and Protective Material; Which Material Is Either Calcium Oxide or Magnesium Oxide. A. J. Jennings, Bridgeport, Conn., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,477,338. Aqueous Emulsion Polymerization of Conjugated Dienes in the Presence of an Aliphatic Monothiol of 2 to 9 Carbon Atoms and Containing a Trichloromethyl Group. J. E. Kirby and W. H. Sharkey, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,477,349. Vinyl Malein Stabilized against Discoloration in Heat with Triethyl Lead Hexyl Maleate and Diphenyl Diphenyl Tin. W. R. Richard, West Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,477,502. Conversion of Normal Butane to Butadiene and Thiophene Containing Products. E. Utterback, New York, N. Y., and

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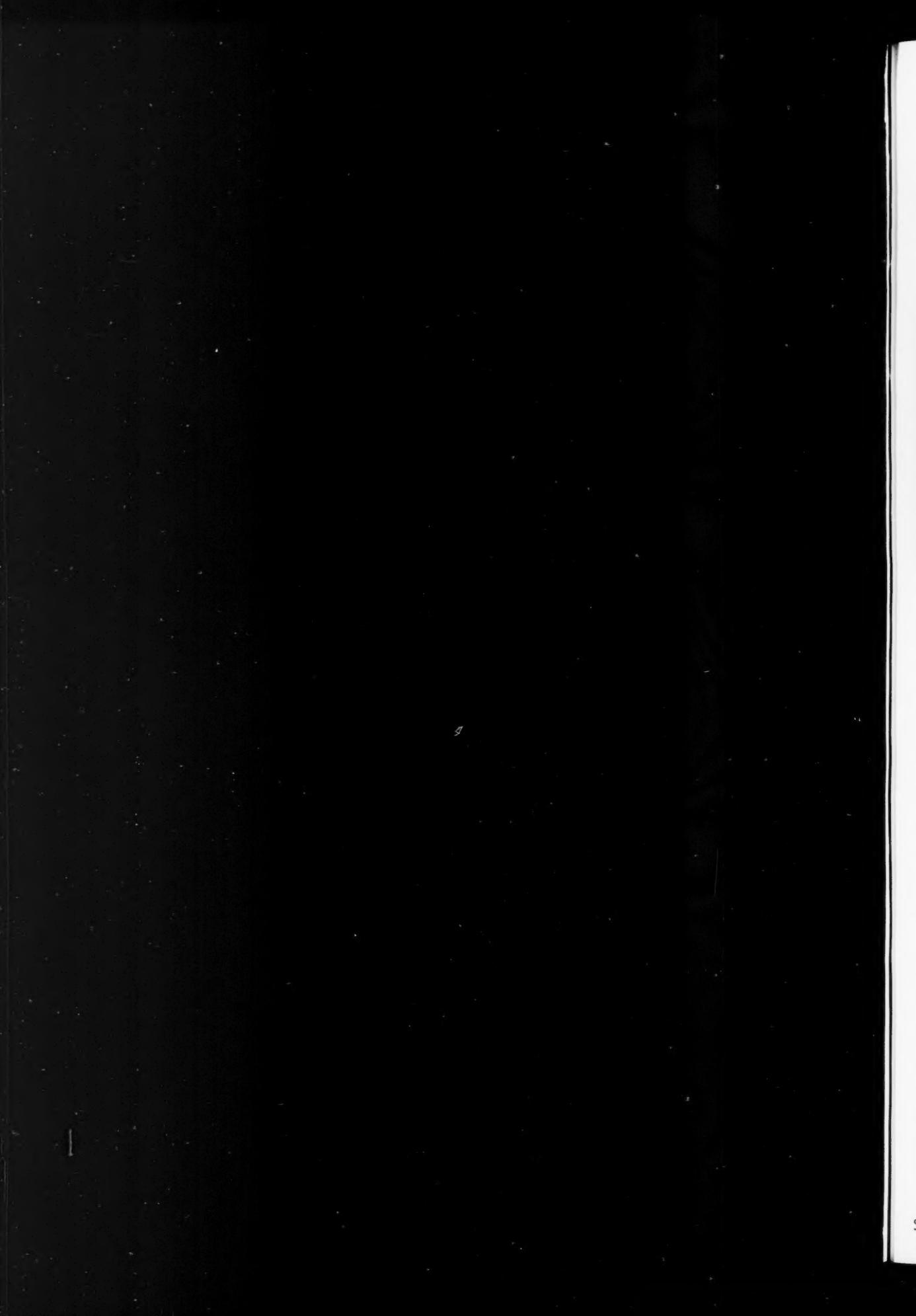
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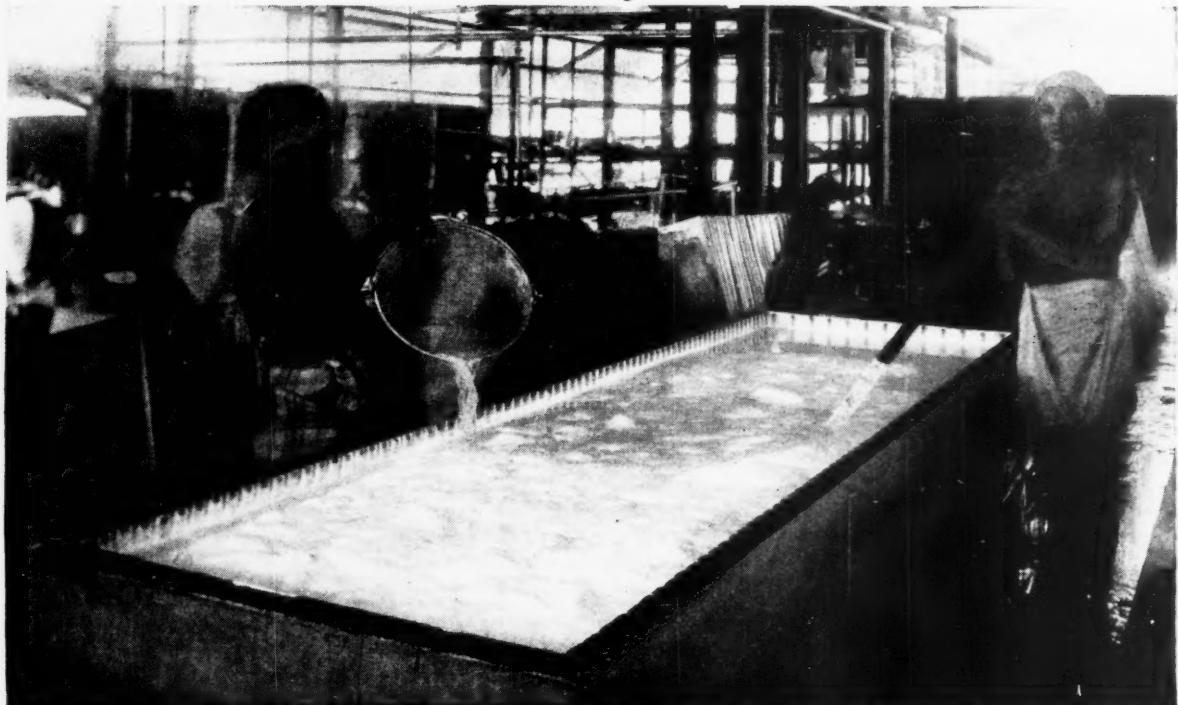
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Scene at Teluk Merbau Estate, Malaya, showing Pepton 22 dispersion being added to natural rubber latex before adding coagulant.

Pepton*22 Plasticizer

CUTS BREAKDOWN TIME AT LEAST 50%

May be added to the latex at the plantation

When you use natural rubber which has had Pepton 22 Plasticizer added to the latex prior to coagulation, you enjoy all its benefits and are saved an extra step in the compounding room.

Use of Pepton 22 reduces the amount of mastication required to achieve the desired plasticity by at least 50%. Pepton shows considerable action at temperatures as low as 212° F. but exerts its best effect at temperatures above 240° F. Pepton 22 also improves processing qualities and has no effect on the physical or aging characteristics of the rubber.

*Reg. U. S. Pat. Off.

AMERICAN CYANAMID COMPANY
CALCO CHEMICAL DIVISION
RUBBER CHEMICALS DEPARTMENT
BOUND BROOK, NEW JERSEY



E. V. Bergstrom, Short Hills, N. J., assignor to Socony-Vacuum Oil Co., Inc., a corporation of N. Y.

457,548. **Polyallyl Ether Compositions Containing an Orthosilicic Acid Ester.** J. R. Roach, Minneapolis, Minn., assignor to General Mills, Inc., a corporation of Del.

Dominion of Canada

457,380. **Curing a Plastic Polymer of an Ester of Acrylic Acid by Heating with Alkali Metal Salt of Silica Dispersed therein.** S. T. Semegen, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

457,381. **Vulcanizing Rubber in the Presence of Elemental Sulfur and a Mixed Organic-Metallic Salt as Accelerator.** A. J. Beber, Copley, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

457,414. **In a Cable Structure, Insulation Material Including an Interpolymer of Isobutylene and a Diolefin Produced at Low Temperature by the Application of Aluminum Chloride Dissolved in an Alkyl Halide Having Less Than 3 Carbon Atoms.** R. M. Thomas, Union, L. E. Lightbown, Elizabeth, and W. J. Sparks, Crawford, assignors to Standard Oil Development Co., Linden, all in N. J., U.S.A.

457,436. **Sensitizing Rubber Latex by the Addition of a Colloidal Suspension of Zinc Oxide.** F. Chassaigne, Alfortville, Seine, France.

457,480. **Polyisobutylene Resin Composition.** A. L. Jenny, Pittsfield, Mass., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

457,481. **Interpolymer of Allyl Allyloxyacetate and Vinyl Acetate.** G. F. D'Allelio, Northampton, Mass., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

457,482. **Alkylation of Halogenosilanes.** P. T. Hurd, Schenectady, N. Y., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

457,502. **Preparation of Liquid Polymeric Dimethyl Silicone.** R. R. McGregor, Verona, and E. L. Warrick, Pittsburgh, Pa., assignors to Corning Glass Works, Corning, N. Y., both in the U.S.A.

457,522. **Polymerizing Organic Compounds to Form Moldable Resins.** C. E. Barnes, Bellvidere, N. J., assignor to General Aniline & Film Corp., New York, N. Y., both in the U.S.A.

457,525. **Modified Phenol-Aldehyde Type of Resin.** E. G. Peterson, assignor to Hercules Powder Co., both of Wilmington, Del., U.S.A.

457,541. **Thickening an Aqueous Dispersion of a Rubber.** V. Golden, Chatham, N. J., assignor to Patent & Licensing Corp., New York, N. Y., both in the U.S.A.

457,549. **As Base for a Light-Sensitive Film, a Hot Milled Strip of a Copolymer of Vinyl Chloride and Vinylidene Chloride and Lead Salts of Wool Fat Acids.** W. L. J. de Nie, Amsterdam, Netherlands, assignor to Shell Development Co., San Francisco, Calif., U.S.A.

457,559-560. **Production in High Proportion and in Good Quality of Resin-Forming Unsaturated Aromatic Hydrocarbons.** N. K. Chaney, Moylan, Pa., and E. L. Hall, Manchester, N. H., assignors to United Gas Improvement Co., Philadelphia, Pa., both in the U.S.A.

457,561. **Conversion of Dicyclopentadiene to Cyclopentadiene.** A. L. Ward, Bala Cynwyd, assignor to United Gas Improvement Co., Philadelphia, both in Pa., U.S.A.

457,664. **Polymerizing a Vinyl Halide in the Liquid Phase in the Presence of a Catalyst Consisting of a Peroxide of an Aldehyde Containing not Less Than 3 and not More Than 4 Carbon Atoms in the Molecule and Containing an Olefinic Double-Bond.** H. P. Staudinger and C. A. Brighton, both of Ewell, and K. H. W. Tucock, Banstead, both in England, assignors to Distillers Co., Ltd., Edinburgh, Scotland.

457,665. **Providing Increased Tensile and Abrasion Resistance in Soft Vulcanized Butadiene-Styrene Rubber by Incorporating a Fraction of the Necessary Sulfur, Partially Curing the Copolymer, Mastering and Incorporating the Remainder of the Sulfur.** E. G. Bargmeyer, Mishawaka, Ind., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

457,666. **Vulcanizing Rubber by Incorporating Sulfur, a Primary Organic Accelerator and a Compound of the Formula Ar-S-NH₂, Where Aryl Is an Aromatic Nucleus of the Benzene or Naphthalene Series Having a Nuclear Carbon Atom Directly Bonded to the S, Which Nucleus Is Further Substituted by an Electronegative Group.** P. T. Paul, Naugatuck, Conn., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

457,667. **Vulcanizing Rubber with the Aid of an Activator of the Formula Aryl-S-NH₂, Where Aryl Is a Carbocyclic Ring Having a Nuclear Carbon Atom Directly Bonded to**

the S, Which Nucleus Is Further Substituted by an Electronegative Group, and R Is an Aliphatic or Aromatic Hydrocarbon Group. P. T. Paul, Naugatuck, Conn., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

457,668. **Incorporating in a Rubber Compound a Cure Retarding Filler, a Curing Agent, Metal in Combination, an Amine Reactive with Carbon Disulfide and Having Replaceable Ammoniacal Hydrogen, a Strong Organic Base Unreactive with Carbon Disulfide, Exposing the Mix to Carbon Disulfide, and Curing.** B. C. Barton, Clifton, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

457,678. **Removing Methanol Soluble Impurities from Polystyrene.** A. J. Warner, South Orange, N. J., assignor to Federal Telephone & Radio Corp., New York, N. Y., both in the U.S.A.

457,696. **Milling Hydrated Lime into an Alkyl Acrylate Polymer to Provide Elastic, Natural Rubber-Like Material.** F. C. Atwood and H. A. Hill, both of Newtonville, Mass., assignors to National Dairy Products Corp., New York, N. Y., both in the U.S.A.

457,720. **Composition Including a Polyvinyl Chloride Resin and Dicyclopentyl Adipate.** F. A. Bent, Berkeley, assignor to Shell Development Co., San Francisco, both in Calif., U.S.A.

457,760. **Vulcanizing Natural or Butadiene-Styrene Rubber in the Presence of a Thiazole or Thioram Accelerator and in the Presence of the Reaction Product of Tall Oil and Triethanolamine.** C. R. Johnson, Ridgewood, assignor to Ridbo Laboratories, Inc., Paterson, both in N. J., U.S.A., and Ridbo Laboratories, Inc., assignor to C. R. Johnson.

457,805. **In the Production of Resins from Resin Oils, the Use of Bentonite and Formic or Oxalic Acid as Catalysts.** D. F. Gould, Riverton, N. J., assignor to Allied Chemical & Dye Corp., New York, N. Y., both in the U.S.A.

457,806. **Fusible, Solid, Thermoplastic Copolymer of Materials Having a Vinyl Group at Least One of Which Is a Dimethyl Styrene.** E. L. Kropf, Old Greenwich, Conn., U.S.A., assignor to American Cyanamid Co., New York, N. Y.

457,809. **Cellulose Ester Plastic in Which the Plasticizer Is a Hexitol Ketal of a Choroacetone with no More Than 2 Free Hydroxyl Groups.** R. M. Goepf, Jr., New Castle, assignor to Atlas Powder Co., Wilmington, both in Del., U.S.A.

457,820. **Resinous Condensation Product of a Polyamide, an Aldehyde and a Salt of a Crystalloidal Amino Carboxylic Acid.** G. F. D'Allelio, Pittsfield, Mass., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

457,822. **Resinous Condensation Product of a Polyamide, an Aldehyde and a Salt of a Crystalloidal Amino Carboxylic Acid.** G. F. D'Allelio, Pittsfield, Mass., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

457,832. **Manufacture of Thermosetting Synthetic Resins by the Polymerization of Alkylene Oxide Derivatives.** P. Castan, assignor to De Trey Frere, S. A., both of Zurich, Switzerland.

457,844-845. **Expanded Thermoplastic Materials.** A. Cooper, assignor to Expanded Rubber Co., Ltd., both of Croydon, Surrey, England.

457,867. **Gas-Expanded Ebonite.** A. Cooper, assignor to Expanded Rubber Co., Ltd., both of Croydon, Surrey, England.

458,040. **Plastics from Alginates.** E. G. Millatt, assignor to Alginite Industries Ltd., (formerly Cefoil, Ltd.), both of Maidenhead, Berkshire, England.

458,041-043. **Resins of the Indene-Styrene-Homolog Comarourne Type, the Indene-Styrene Homolog Type, and the Comarourne-Indene Type.** E. L. Cline, Philadelphia, Pa., assignor to Allied Chemical & Dye Corp., New York, N. Y., both in the U.S.A.

458,074. **Adhesive Composition Including a Depolymerized Rubber together with a Partially Reacted Soluble Phenol-Aldehyde Resin.** C. O. Smith, West Englewood, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

458,075. **Sulfonamide Formed by Oxidative Condensation between an Amine and a Sulfur-Containing Organic Compound.** P. T. Paul and B. A. Hunter, both of Naugatuck, Conn., U.S.A., assignors to Dominion Rubber Co., Ltd., Montreal, P.Q.

458,076. **Flexible Polymeric Products Derived from Vinyl Aromatic Compounds and Aliphatic Conjugated Diolefins.** C. O. Guss, Madison, Wis., and R. W. Amison, assignors to Dow Chemical Co., both of Midland, Mich., both in the U.S.A.

458,116. **Continuously Stripping Latices of Emulsion Polymerization.** A. D. Green, Cranford, assignor to Standard Oil Development Co., Linden, both in N. J., U.S.A.

458,206. **As a New Compound, 2,5-Dichloro Phenyl Sulfenamide.** R. A. Coleman, Naugatuck, Conn., U.S.A., assignor to Dominion Rubber Co., Montreal, P.Q.

458,248. **Creaming Synthetic Latices.** E. Arundale, Westfield, assignor to Standard Oil Development Co., Linden, both in N. J., U.S.A.

United Kingdom

621,129-130. **Synthetic Bonding Agent.** Stidsvigs & Helsingborgs Limfabriker A. B.

621,165. **Synthetic Resin Adhesives.** Imperial Chemical Industries, Ltd., E. J. G. Bailey, and J. M. de M. Estevez.

621,199. **Vulcanization of Rubber Articles.** Cie. General D'Electricite.

621,219. **Halocrylic Compounds.** General Aniline & Film Corp.

621,243. **Symmetrical Dichloromethyl Tetramethylsiloxane.** Corning Glass Works.

621,362. **Alkali-Resistant Alginate Materials.** Alginate Industries, Ltd., J. B. Speakman, N. H. Chamberlain, and C. M. C. Dorkin.

621,467. **Aqueous Emulsion Polymerization Processes.** Mathieson Alkali Works.

621,555. **Fluorocarbon.** Imperial Chemical Industries, Ltd., and N. F. Sarsfield.

621,618. **Wetting, Foaming, Detergent, and Emulsifying Agents.** G. H. Briggs, Ltd., and H. Adams.

621,681. **Plasticizing Substances.** Cie. Francaise de Raffinage.

621,703. **Resin-Like Copolymers.** C. Arnold Standard Oil Development Co.

621,742. **Condensation - Polymerization Products of Silicon Ortho-Esters.** B. Gluck, W. E. Smith, and C. Shaw.

621,765. **Solid, Purified Alkyl Sulfonates.** Severocecske Tuvoke Zavody (Drive Jiri Schichti) Narochni Podnik.

621,784. **Polyvinyl Acetal Resins.** Shawinigan Chemicals, Ltd.

621,845. **Thermoplastic Composition.** Australian Laboratories, Inc.

621,883. **Thermo-Hardenable Organo-Silicic Resins.** Soc. des Usines Chimiques Rhone-Poulenc.

621,885. **Modified Polystyrene Resins.** British Resin Products, Ltd., E. M. Evans, and J. F. Williams.

621,910. **Halogenated Vinyl Ether Polymers.** General Aniline & Film Corp.

621,911. **Polymerizing Vinyl Ethers.** General Aniline & Film Corp.

621,960. **Treatment of Haloacrylic Resins.** General Aniline & Film Corp.

621,971. **Polymers.** J. G. N. Drewitt and J. Lincoln.

621,977. **Poly-Ester-Amides.** J. G. N. Drewitt and G. F. Harling.

621,998. **Treatment of Natural Rubber Latex.** Nederlandsch Indisch Instituut Voor Rubberonderzoek.

622,124. **Synthetic Resins.** American Cyanamid Co.

622,129. **Preparation of Organo-Silicic Oils.** Soc. des Usines Chimiques Rhone-Poulenc.

622,134. **Processing Rubbery Vinyl Ether Polymers.** General Aniline & Film Corp.

622,208. **Forming Water-Insoluble Layers for Colloids on Surfaces of Materials.** Naamloze Vennootschap W. A. Scholten's Chemische Fabrieken.

622,235. **Alkyd Copolymers.** Wingfoot Corp.

622,252. **Polythene Compositions.** E. I. du Pont de Nemours & Co., Inc.

622,300. **Plastic Composition.** Hercules Powder Co.

622,323. **Preparing Hydrocarbon-Substituted Silanes.** British Thomson-Houston Co., Ltd.

622,332. **Molding Compositions.** Imperial Chemical Industries, Ltd., J. H. Williams, and T. Ward.

622,374. **Photo-Polymerization of Compounds Containing the Ethylene Double-Bond.** E. I. du Pont de Nemours & Co., Inc.

622,463. **Manufacture of Organo Silicon Compounds by the Grignard Reaction.** A. E. Meadowcroft, C. Shaw, and W. E. Smith.

622,481. **Interpolymers and Moistureproof Sheet Wrapping Material Coated therewith.** E. I. du Pont de Nemours & Co., Inc.

622,482. **Polymerization Products.** Distillers Co., Ltd., C. A. Brighton, M. D. Cooke, D. Faulkner, J. J. P. Staudinger, and D. Clevedon.

622,511. **Aqueous Emulsions, Latices, Dispersions of Polymers and Interpolymers of Vinyl Chloride.** Imperial Chemical Industries, Ltd., and A. K. Sanderson.

622,516. **Preparing Hydrocarbon-Substituted Halogenosilanes.** British Thomson-Houston Co., Ltd.

622,518. **Pigmented Rubber.** Harmon Color Works.

622,559. **Diphenylacetonitrile.** E. Lilly & Co.

622,576. **Reclaiming Vulcanized Scrap.** United States Rubber Co.

622,657. **Preparation of Oil-Soluble Phenolic Resins.** Bakelite Corp.

622,671. **Electric Insulation Containing Synthetic Resin.** Imperial Chemical Industries, Ltd., A. A. Drummond, and B. Jacob.

622,675. **Synthetic Resinous Condensation Products.** Imperial Chemical Industries, Ltd., D. Atherton, and W. Charlton.

622,690. **Alkylated Phenols.** Firestone Tire & Rubber Co.

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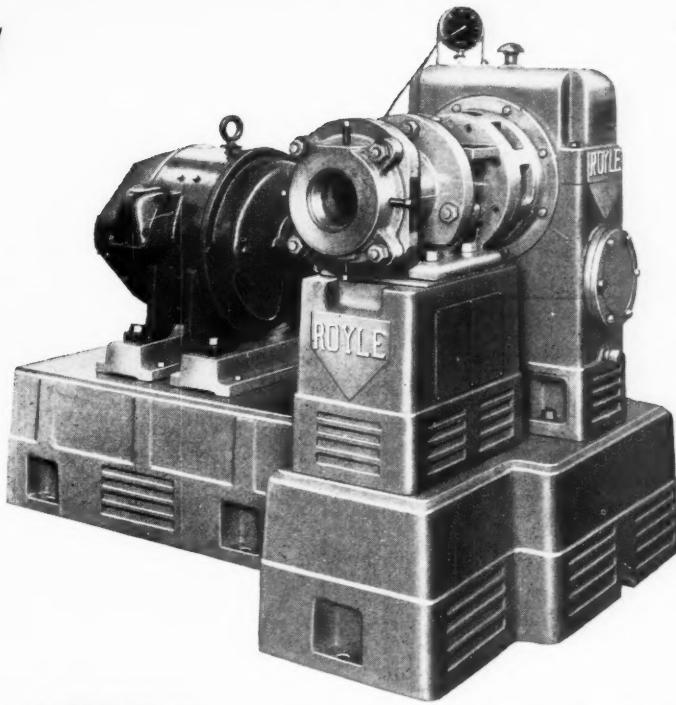
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622,743. **Poly (Methyleneamide) Resinous Condensation Products.** L. Berger & Sons, Ltd., H. J. Tattersall, and L. E. Wakeford, 622,758. **Phenol-Aldehyde-Amine Condensation Product.** Bakelite Corp.

622,944. **Polymers of Monomeric Compounds.** B. F. Goodrich Co.

622,948. **Styrene-Oil Interpolymers and Coating Compositions therefrom.** L. Berger & Sons, Ltd., L. E. Wakeford, and F. Armitage, and R. H. Buckle and E. Booth, legal representatives of D. H. Hewitt, deceased.

622,949. **Resin-Modified Styrene Copolymers.** L. Berger & Sons, Ltd., L. E. Wakeford, and F. Armitage, and R. H. Buckle and E. Booth, legal representative of D. H. Hewitt, deceased.

622,970. **Organic-Silicon Halides.** Dow Chemical Co.

622,975. **Preservation of Rubber.** Imperial Chemical Industries, Ltd., A. S. Briggs, J. Haworth, and H. E. Jackson.

622,978. **Coating Compositions.** E. L. du Pont de Nemours & Co., Inc.

622,985. **Organic Silicon Derivatives.** Soc. des Usines Chimiques Rhone-Poulenc.

623,309. **Polyesters.** J. W. Fisher and J. Lincoln.

623,361. **Colloidal Aqueous Dispersion of a Resinous Copolymer of Melamine, Urea and Formaldehyde.** American Cyanamid Co.

623,362. **Melamine-Formaldehyde Condensation Product.** American Cyanamid Co.

623,409. **Dialkyl Esters of Fumaric Acid from Maleic Anhydride.** Wingfoot Corp.

623,416-417. **Derivatives of Polyvinylisocyanate.** General Aniline & Film Corp.

623,422. **Polymerization of Vinyl Sulfonic Acid and Derivatives thereof.** General Aniline & Film Corp.

623,472. **Polymerization of Ethylenically Unsaturated Compounds.** E. L. du Pont de Nemours & Co., Inc.

623,583. **Recovery of Ethylene Oxide.** Distillers Co., Ltd., and F. J. Wilkins.

623,607. **Preparation of Cellulose Ethers.** Hercules Powder Co.

623,705. **Chlorinated Polymers.** E. L. du Pont de Nemours & Co., Inc.

623,815. **Catalysts for Use in the Synthesis of Hydrocarbons.** J. C. Arnold (Standard Oil Development Co.).

623,996. **Emulsions of Polymeric Organic Polysulfides.** B. F. Goodrich Co.

624,012. **Preparation of Polychloroprene Compositions.** E. L. du Pont de Nemours & Co., Inc.

624,015. **Alkyl Esters of Alpha-Beta Unsaturated Carboxylic Acids.** B. F. Goodrich Co.

624,019-020. **Preparation of Polysiloxane Resins.** British Thomson-Houston Co., Ltd.

624,062. **Insulating and Dielectric Materials.** British Thomson-Houston Co., Ltd.

624,079. **Liquid Vinyl Resin Dispersion Process.** H. J. Fitzpatrick (Advance Solvents & Chemical Corp.).

624,086. **Organic-Silicon Compounds.** Corning Glass Works.

MACHINERY

United States

2,475,267. **Mechanism for Molding Rubber and Like Articles.** E. M. Winegar, assignor to Ohio Rubber Co., both of Willoughby, O.

2,475,378. **Transfer Molding Press.** A. De Ghetto, Clifton, N. J., assignor to National Rubber Machinery Co., Akron, O.

2,475,395. **Injection Molding Machine.** N. Lester, Shaker Heights, assignor to Lester Engineering Co., Cleveland, both in O.

2,475,578. **Tire Recapper.** J. W. Napier, assignor to C. O. Dennis, both of Macon, Ga.

2,475,714. **Repair Device for Inner Tubes and Other Pliable Articles.** N. Stevens, Chicago, Ill.

2,476,290. **Apparatus for Lasting with an Adhesive.** J. Fossa, Salem, Mass., assignor to United Shoe Machinery Corp., Flemington, N. J.

2,476,395. **Apparatus for the Centrifugal Molding of Solid Articles from Plastic Materials.** R. Williams, Stratfield, N. S. W., Australia.

2,476,431. **Heating Device for Melting Rubberized Bituminous Compositions.** A. M. Root, Jr., Rutherford, N. J., assignor to Patent & Licensing Corp., New York, N. Y.

2,476,530. **Device to Cut Tubes into Ring Gaskets.** J. Belada, Glassboro, N. J., assignor to Owens-Illinois Glass Co., a corporation of O.

2,476,550. **Injector for Injection Molding Machines.** C. Jobst, assignor, by means assignments, to Owens-Illinois Co., both of Toledo, O.

2,476,558. **Apparatus for Molding Plastics.**

S. K. Moyness, assignor to Minneapolis-Honeywell Regulator Co., both of Minneapolis, Minn.

2,476,868. **Apparatus for Continuously Vulcanizing Strip Material.** R. F. Hrebek, University Heights, assignor to Columbia Rubber Mold Co., Cleveland, both in O.

2,477,040. **Sewing Machine for Thermoplastic Materials.** G. H. Brown and R. A. Biernirth, both of Princeton, N. J., assignors to Radio Corp. of America, a corporation of Del.

2,477,214. **Electrode Structure for High-Frequency Sealing of Thin Thermoplastic Sheet Material.** T. H. Story, Merchantville, N. J., assignor to Radio Corp. of America, a corporation of Del.

2,477,301. **Machine for Removing an Airbag from a Tire.** E. C. Kastner, assignor to Akron Standard Mold Co., both of Akron, O.

2,477,313. **Machine for Joining Layers of Thermoplastic Sheet Materials by the Heating Effect of Electric Stress Alternating at High Frequency.** J. C. Quayle, Helsby, and P. Jones, Kelsall, assignors to British Insulated Callender's Cables, Ltd., London, all in England.

2,477,341. **Electric Heater for Extrusion Dies for Plastic Materials.** G. V. Malmenber, Forest Hills, N. Y.

2,477,368. **Injection Molding Apparatus.** J. A. Gits, Chicago, Ill.

United Kingdom

622,432. **Apparatus for Manufacturing Articles of Thermoplastic Materials.** S. P. A. Lavorazione Materie Plastiche.

625,180. **High-Frequency Devices for Heating or Bonding Thermoplastic Materials.** Radio Corp. of America.

625,375. **Apparatus for Preparing Rubber Conglomerate.** Platters Engineering Co., Ltd., and J. Schofield.

UNCLASSIFIED

United States

2,474,926. **Axially Shifting-Type Lever-Operated Tire Remover.** J. W. York, Falls City, Neb.

2,475,288. **Fungicides and Insecticides.** E. C. Ladd, Passaic, N. J., assignor to United States Rubber Co., New York, N. Y.

2,475,451. **Tire Valve Retaining Device.** R. Gouraud, New York, N. Y.

2,476,209. **Safety Ring Clamp for Tires.** L. Monheit, Atlantic City, N. J.

2,476,220. **Life Preserver Valve.** C. W. Rector, Cleveland, O.

2,476,480. **Hose and Tube Fitting.** A. A. Jurek, Burbank, and S. C. Christian, Woodland Hills, both in Calif., assignors, by means assignments, to Aeroquip Corp., Jackson, Mich.

2,476,823. **Removing Surface Impurities from Polonium-Plated Metal.** T. A. O'Neil, Cuyahoga Falls, assignor to Firestone Tire & Rubber Co., Akron, both in O.

2,476,825. **Wheel Raising and Lowering Mechanism for Gun Carriages.** R. W. Allen, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,826. **Welding Bung-Reinforcing Structures for Barrels.** L. H. Conger, Jr., assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,477,051. **Antiskid Device.** H. J. Eisenhauer, Sr., Buffalo, N. Y.

Dominion of Canada

456,850. **Cable Connector.** W. M. Lawhorn, Primors, assignor to Atlantic Refining Co., Philadelphia, both in Pa., U. S. A.

457,003. **Endless-Belt Aligning Means.** G. A. Lyon, Detroit, Mich., U. S. A.

457,931. **Device for Uniformly Tightening Valve Stem Parts on a Tire Tube.** L. C. Broecker, assignor to Bridgeport Brass Co., both of Bridgeport, Conn., U. S. A.

457,070. **High-Voltage Electric Cable Termination and Joint.** C. J. Beaver, Bowdon, E. L. Davey, Timperley, and J. H. Pirie, Hale, assignors to W. T. Glover & Co., Ltd., Manchester, all in England.

457,104. **Guard Ring for Resisting Extrusion of Rubber-Like Sealing Rings into the Working Clearance of Cylinder-Piston Assemblies.** D. J. Whittingham, Chicago, Ill., assignor to New York Air Brake Co., New York, N. Y., both in the U. S. A.

457,382. **Tool for Collapsing Hollow Rivets.** R. S. Colley, Kent, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U. S. A.

457,412. **Means for Treating Tire Fabric.** R. P. Allen, Akron, assignor to Seiberling Rubber Co., Barberston, both in O., U. S. A.

457,614. **Press to Remove Tires from Wheel Rims.** N. Robielle, Roberval, P.Q.

457,825. **Inflator for Cycle Tires.** F. W. Bluemel, assignor to Bluemel Bros., Ltd., both of Wiston, Warwick, England.

457,987. **Device for Inspection of Tire Treads.** B. F. McGovern, assignor to Wingfoot Corp., both of Akron, O., U. S. A.

United Kingdom

622,710. **Instruments to Find Faults in Electric Cables.** H. J. and A. D. Osborn.

622,837. **Helicopters.** Firestone Tire & Rubber Co.

623,046. **Fluid Operated Jack.** Dunlop Rubber Co., Ltd., and H. W. Trevaskis.

623,334. **Hose Couplings.** L. Le C. Eastman.

623,758. **Tension Joints and Clamps for Steel-Cored Electric Conductors.** Pirelli General Cable Works, Ltd., and J. R. Harding.

624,014. **Device to Indicate Automatically Decrease of Pressure in Pneumatic Tires While Running.** W. H. Gardiner.

624,148. **Cable Fault Finding Apparatus.** Western Electric Co., Inc.

624,186. **Dual Tire Valve.** H. N. Wheeler.

625,184. **Treating Natural Cellulosic Fibers.** United States Rubber Co.

625,421. **Connectors or Valve Assemblies for Inflatable Structures.** Wingfoot Corp.

625,726. **Disk Brakes, Particularly for Landing Wheels of Aircraft.** Dunlop Rubber Co., Ltd., and H. J. Butler.

625,739. **Brakes.** Dunlop Rubber Co., Ltd., and H. J. Butler.

TRADE MARKS

United States

442,772. **Dreadnaught.** Tire chains. Columbus McKinnon Chain Corp., Tonawanda, N. Y.

442,779. **Paramount.** Inner tubes. Robbins Tire & Rubber Co., Inc., Tuscaloosa, Ala.

442,796. **Pariein.** Fatty acid esters. Baker Castor Oil Co., Bayonne, N. J.

442,817. **Panelyte.** Resinous plastic and thermoplastic materials. St. Regis Paper Co., N. Y.

442,820. Representation of a crest and the words: "House of Rothchild." Corsets, girdles, garter belts, etc. House of Rothchild, Inc., New York, N. Y.

442,851. **Advagum.** Plastic masses. Advance Solvents & Chemical Corp., New York, N. Y.

442,865. **Sunoco.** Rubber mountings or fittings. Sun Oil Co., Philadelphia, Pa.

442,892. Representation of a circle cut by a rectangle containing the word: "Knatulax." Aqueous dispersion of rubber. Latex Distributors, Inc., New York, N. Y.

442,924. **Animator.** Footwear. Huiskamp Bros. Co., Keokuk, Iowa.

442,928. Representation of a bow and arrows. Footwear. B. F. Goodrich Co., New York, N. Y.

442,933. Representation of a label containing a representation of a house on an arrow pointing to a piece of stitched fabric and the words: "Four ④ Line." Shower curtains. House Beautiful Curtains, Inc., New York, N. Y.

442,953. **Beltex Nylax.** Sanitary belts. Beltex Corp., St. Louis, Mo.

442,979. **Beautykote.** Synthetic adhesive cement. Beautykote Corp., Newark, N. J.

442,980. **Super-Tex.** Synthetic adhesive cement. Tex Products, Inc., Newark, N. J.

442,991. Representation of an oval cut by a representation of a road on which is a car and above which is the word: "Trico." Fluid operated auto accessories. Trico Products Corp., Buffalo, N. Y.

508,883. **Brentwood.** Tires. Pharis Tire & Rubber Co., Newark, O.

509,004. The word: "Flatex" between dashes. Garters. A. J. Donahue Corp., Middletown, Conn.

509,008. **Acme.** Syringes and elastic bandages. Acme Dickinson & Co., Rutherford, N. J.

509,181. **T-belt.** Sanitary belts. Gertee Mfg. Co., New York, N. Y.

509,035. **Polyclizer.** Plasticizers. Harwick Standard Chemical Co., Akron, O.

509,098. The outline of a tire casing and the word: "LifeGuard." Inner tubes. Good-year Tire & Rubber Co., Akron, O.

(Continued on page 756)

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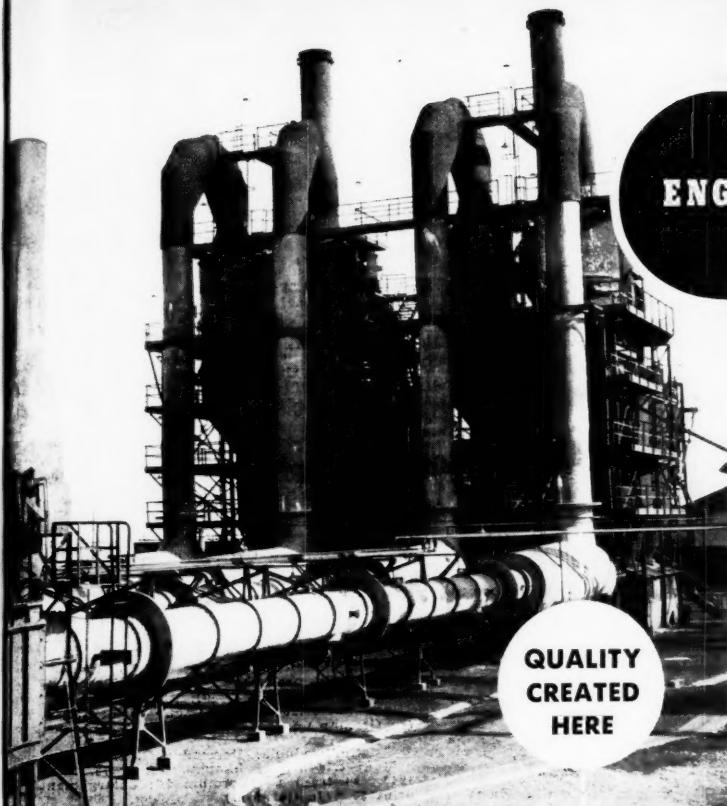
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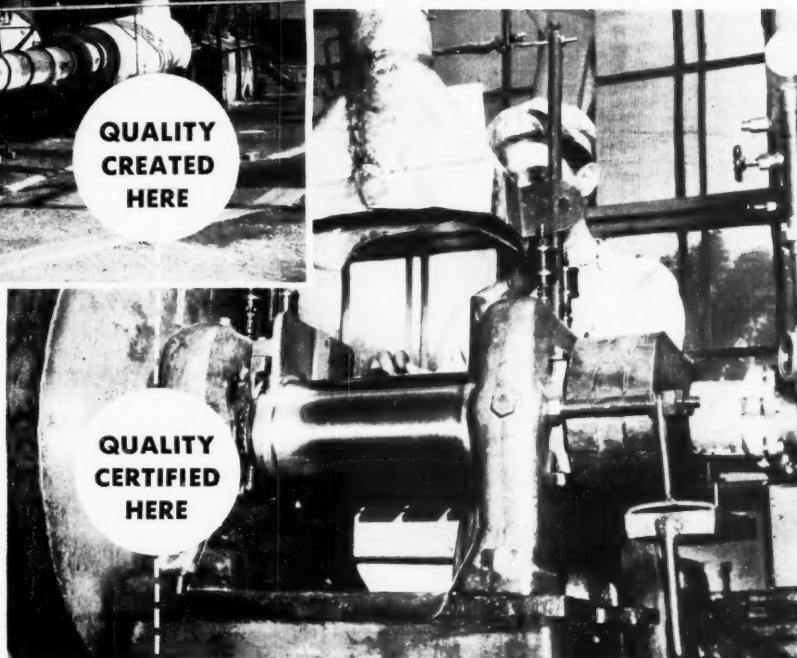
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OTS Bibliography Reports on Rubber Products—XVII

THE reports and abstracts thereof given below are taken from the Department of Commerce's monthly publication, "Bibliography of Scientific and Industrial Reports." Reports available in microfilm, enlargement print, or photostatic form may be obtained from the Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C., with accompanying check or money order payable to the Librarian of Congress. Reports available in printed or mimeographed form may be obtained from the Office of Technical Services, United States Department of Commerce, Washington 25, D. C., with accompanying check or money order payable to the Treasurer of the United States.

Products of Sulfo-Chlorination of n-Butane and Propane. Breaking Up of Aliphatic Sulfonated Acid Chlorides. I. G. Farbenindustrie A.G., Merseburg, Germany. PB-9107. 1940-1944. 47 frames. Microfilm \$2.50; enlargement print \$7.50. This report covers sulfo-chlorination of aliphatic acids, n-butane, and various hydrocarbons. (In German.)

Developments and Improvements in Connection with Synthetic Rubber Production. I. G. Farbenindustrie A.G., Schkopau, Germany. PB-91137. 1940-1944. 298 frames. Microfilm \$9; enlargement print \$49. (In German.)

Reports and Notes on the Production and Further Processing of Butene-Diol. I. G. Farbenindustrie A.G., Schkopau, Germany. PB-91117. 1938-1944. 84 frames. Microfilm \$8.75; enlargement print \$18.50. (In German.)

Reports on Polymerization and Principles and Problems in the Design of Butadiene Catalyst Chambers. I. G. Farbenindustrie A.G. PB-91112. 1937-1944. 24 frames. Microfilm \$2; enlargement print \$5. This report deals with butadiene polymerization and production and design of catalyst furnaces. (In German.)

Rubber Degradation Apparatus for Testing Thermo-Plasticizing without Pressure. I. G. Farbenindustrie A.G., Schkopau, Germany. PB-91181. 1942-1944. 4 frames. Microfilm \$1.25; enlargement print \$2.50. (In German.)

German Standards and Specifications for Rubber Conveyor Belts and Their Fabric Insertion, and for Armored Petrol Hose. Continental Gummiwerke A.G., Hannover. PB-90747. 1943-1944. 16 frames. Microfilm \$1.75; enlargement print \$3.75. (In German.)

Rubber Machinery: Technical Drawings. Continental Gummiwerke A.G., Hannover. PB-90751. 1936-1945. 164 frames. Microfilm \$6.25; enlargement print \$22.50. (In German.)

Cellular Rubber and Plastics. A. Cooper and others. PB-93484. March, 1947. 158 pages. Microfilm \$5.50; photostat \$17.50. This report considers German sponge rubbers, Desmodurs, and Moltoprens.

Heat-Sensitization and Reclaiming of Buna, Perbunan, Etc. I. G. Farbenindustrie A.G., Kautschuk-Zentral-Laboratorium. PB-90755. 1945. 19 frames. Microfilm \$1.75; enlargement print \$3.75.

The Production of Buna: Individual Articles on Synthetic Rubber. 1942-1945. I. G. Farbenindustrie A.G. PB-93675. November, 1945. 2 pages. Microfilm \$1.25; photostat \$1.25.

Buna Production and Distribution. Part III. I. G. Farbenindustrie A.G. PB-92518. 1937-1945. 799 frames. Microfilm \$9; enlargement print \$193.75. Continuation of PB-91354. (In German.)

Distyrol as a Softener for Buna. I. G. Farbenindustrie A.G., Schkopau. PB-91207. 1943. 6 frames. Microfilm \$1.25; enlargement print \$2.50. (In German.)

Status of Koresin, the German Tackifier for Synthetic Rubber. H. L. Fisher and E. R. Weidlein, Jr. PB-92010. 11 pages. Microfilm \$1.75; photostat \$2.50.

Rubber Regeneration by Dispersion (Half-Thermal Methods). I. G. Farbenindustrie A.G., Schkopau. PB-91186. 1941-1942. 5 frames. Microfilm \$1.25; enlargement print \$2.50. (In German.)

Electrical Aspects of Buna, with Some Notes on Other Dielectrics. G. M. Hamilton and A. A. New. Part I. PB-94558. 1946. 318 pages. Microfilm \$9; photostat \$40. Part II. PB-94559. 1946. 488 pages. Microfilm \$9; photostat \$61.25.

Plasticizing of Buna in Storage and at Room Temperatures. Physiological Effects of Buna Products. I. G. Farbenindustrie A.G., Schkopau. PB-91163. 16 frames. Microfilm \$1.75; enlargement print \$3.75.

State of Research Work on Activation of Buna S Polymerization and Mersolate for Emulsion Polymerization with Reduction Agents. Dr. Loesemann. PB-92607. October, 1945. 39 pages. Microfilm \$2; photostat \$3.75.

German Synthetic Rubber Mechanical Goods. Summary Report. Rubber Bureau, U. S. War Production Board and U. S. Office of Rubber Reserve. PB-92906. August, 1948. 14 pages. Microfilm \$1.75; photostat \$2.50. (Also available from Superintendent of Documents, Washington 25, D. C.; price \$0.25.)

Production of Monomeric Styrene at Chemische Werke, Huls. H. W. Ashton and T. W. Flavel. PB-94624. March, 1947. 399 pages. Microfilm \$9; photostat \$50.

The Chemical Bonding of Sulfur in Vulcanized Buna S. I. G. Farbenindustrie A.G., Schkopau. PB-93086. 1944. 9 frames. Microfilm \$1.25; enlargement print \$2.50. (In German.)

Graphs and Tables Showing Thermal Degradation and Vulcanization Values for Buna S. I. G. Farbenindustrie A.G., Schkopau. PB-93934. 38 frames. Microfilm \$2.25; enlargement print \$6.25. (In German.)

Igelit PCU Plant: Production Data on Auxiliary Materials for Rubber Tires (Fillers, Vulcanizers, Regenerators, Anti-Aging Media, Etc.). I. G. Farbenindustrie A.G., Schkopau. PB-91441. 1943-44. 23 frames. Microfilm \$2; enlargement print \$6. (In German.)

Igelit PCU Plant: Test Reports on Fillers for Buna Isoprene Polymers Lu, and Polymeric Phosphorus Nitrile Chloride. I. G. Farbenindustrie A.G., Schkopau. PB-91442. 1940-42. 25 frames. Microfilm \$2; enlargement print \$5. (In German.)

Tests of the Effects of Plasticizers and Softeners, Accelerators, Fillers and Carbon Black on Buna. I. G. Farbenindustrie A.G., Schkopau. PB-93091. 1941-43. 148 frames. Microfilm \$5.75; enlargement print \$20. (In German.)

Manufacture of Koresin. I. G. Farbenindustrie A.G., Schkopau. PB-93066. 1943-46. 96 frames. Microfilm \$4.25; enlargement print \$13.75. (In German.)

Cold Resistant Buna. I. G. Farbenindustrie A.G., Schkopau. PB-95579. 1942-1943. 12 frames. Microfilm \$1.75; enlargement print \$3.75. (Text in German.)

Diazo-Amino-Benzol for Sponges Made from Igelit PCU, and Vulcanization of Synthetic Rubber without Sulfur. I. G. Farbenindustrie A.G., Schkopau. PB-95155. 1944. 3 frames. Microfilm \$1.25; enlargement print \$2.50. (Text in German.)

Substitution of Other Substances for Linoleic Fatty Acid in the Polymerization of Buna S. I. G. Farbenindustrie A.G., Schkopau. PB-96577. 1939-1944. 26 frames. Microfilm \$2; enlargement print \$5. (Text in German.)

Chemical and Physical Examination of Standard Colloidal Alumina. PB-8806584. March, 1948. 9 pages. Microfilm \$1.25; photostat \$1.25. (Text in German.)

The Properties of Technical Types of Buna Rubber, and Their Influence on the Molding of Rubber Components. H. Roelig. PB-96507. February, 1942. 15 pages. Microfilm \$1.75; photostat \$2.50.

Rubber Industry in Germany during the Period 1939-1945. T. R. Dawson. PB-95401. 1948. 150 pages. (Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y.) Price, 90c.

Buna S Plant; Buna N (1944-1945). I. G. Farbenindustrie A.G., Frankfurt. PB-96570. 13 frames. Microfilm \$1.75; enlargement print \$3.75. (Text in German.)

Manufacture of Buna. I. G. Farbenindustrie A.G., Huels. PB-95233. 1945. 6 frames. Microfilm \$1.25; enlargement print \$2.50. (Text in French.)

Cold Bonding of Perbunan and Buna S with Metal, Plexiglas, Laminated Hard Glass, and Wood. I. G. Farbenindustrie A.G., Schkopau. PB-95215. 1944. 16 frames. Microfilm \$1.75; enlargement print \$3.75. (Text in German.)

Experiments and Tests on Igelit PC and PCU Fibers, Films, Etc. I. G. Farbenindustrie A.G., Schkopau. PB-95706. 1940-1944. 177 frames. Microfilm \$6.50; enlargement print \$23.75. (Text in German.)

Sulfur-Containing Plasticizers for Igelit. I. G. Farbenindustrie A.G., Schkopau. PB-96779. 1944. 28 frames. Microfilm \$2; enlargement print \$5. (Text in German.)

Investigation Concerning Rubber and Plastic Linings. F. F. Jaray and others. PB-95400. April, 1947. 26 pages. Microfilm \$2; photostat \$3.75. (Part of Appendix II is in German.)

Plastic Products: Desmophen 1100, Desmosit M, and Desmosit X. I. G. Farbenindustrie A.G., Schkopau. PB-96561. 1942. 9 frames. Microfilm \$1.25; enlargement print \$2.50. (In German.)

Plastic Products: Desmodur R. I. G. Farbenindustrie A.G., Schkopau. PB-96578. 1933-1944. 24 frames. Microfilm \$2; enlargement print \$5. (In German.)

Plastic Products: Polyamides and Mixed Polyamides. I. G. Farbenindustrie A.G., Ludwigshafen. PB-96852. 1938-1945. 162 frames. Microfilm \$6.25; enlargement print \$22.50. (In German.)

Plastic Products: Desmophen 300, 800, 900, 1100, 1400, and Desmosit C, H, HH, O, T (Vulkollan T). I. G. Farbenindustrie A.G., Schkopau. PB-96565. 1942-1944. 43 frames. Microfilm \$2.50; enlargement print \$7.50. (In German.)

Butadiene, Butene-Diol, and Butane-Diol Catalysts. I. G. Farbenindustrie A.G., Schkopau. PB-95567. 1935-1944. 155 frames. Microfilm \$6; enlargement print \$21.25. (In German.)

Dutch Report on German Plastics Industry, Part II. J. Hoekstra and others. PB-95139. May, 1947. 35 pages. Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. Price \$1.25. Covers plants of I. G. Farbenindustrie A.G., Ludwigshafen; Raschig, G.m.b.H., Ludwigshafen; Rohm & Haas, Darmstadt; Wacker Gesellschaft für Elektrochemische Industrie, Burghausen; Käkelund Metallwerke Neumeyer, Nuremberg; and Aluminum-Walzwerke, Forchheim. Also covers German phenol production, vinyl chloride polymerization and production, Luytherm process, and production of various polymers.

Manufacture of Igelit PCU (Polyvinyl Chloride) and Igelit MP. I. G. Farbenindustrie A.G., Ludwigshafen. PB-95239. 1945. 9 frames. Microfilm \$1.25; enlargement print \$2.50. (In French.)

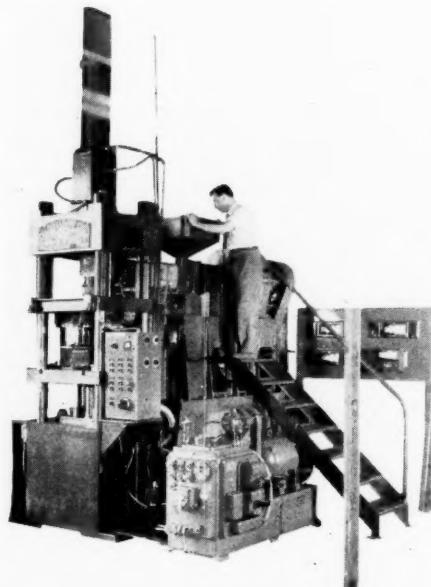
Plastic Products: Desmodur DR, a Linking Agent for Igamid 6a. I. G. Farbenindustrie A.G., Schkopau. PB-95193. 1943-1944. 20 frames. Microfilm \$1.75; enlargement print \$3.75. (In German.)

Plastic Products: Plasticator III. I. G. Farbenindustrie A.G., Schkopau. PB-95105. 1944. 3 frames. Microfilm \$1.25; enlargement print \$2.50.

Plastic Products: Porofor 254 and Porofor D8, Two New Foaming Agents. I. G. Farbenindustrie A.G., Schkopau. PB-95106. 1944-1945. 8 frames. Microfilm \$1.25; enlargement print \$2.50.

(To be continued)

New Machines and Appliances

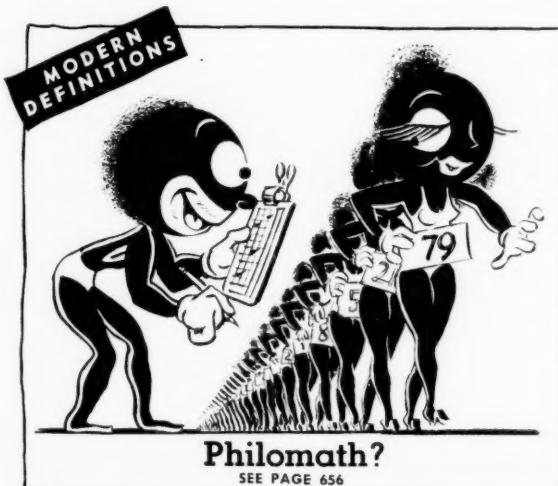


Jackson & Church's New 48-Ounce Injection Molder. Showing Temperature Control Panel and Pumping Unit

Universal Injection Machine

INJECTION molding of mechanical rubber goods has been simplified with a new universal injection molding machine manufactured by Jackson & Church Co., Saginaw, Mich., and invented by James Hendry, company general manager. Compounded rubber in strip or pellet form is added to a hopper where an extruder pump with three separately heated zones forces the material into a heated vertical type injection cylinder. A vertical two-ram transfer-type press then forces the preheated rubber into the mold cavities. The process gives a product having no flash thus requiring a minimum of trimming and reducing handling of the molded part.

Although the accompanying illustration is of a 48-ounce machine designed primarily for plastics, larger machines having capacities



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- ★ Resists heat and aging.
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PRESSES



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Type "E" is now being used by leading rubber factories. It handles air, water, or oil, with equal ease.

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Ask for literature telling all about Type "E". We can tell you here, briefly, that the body is made of the strongest forged steel obtainable. All of the internal metal parts are of hard chromium plated stainless steel. A formed packing of special material superior to leather is used which is immune to all fluids commonly used in hydraulic machinery. The pressure on the seat is balanced by a piston with the result that variations in high initial pressure have little effect on the reduced pressure. Want complete data?

For other ATLAS rubber factory products see the partial list in our ad in the January, 1949, issue of *INDIA RUBBER WORLD*

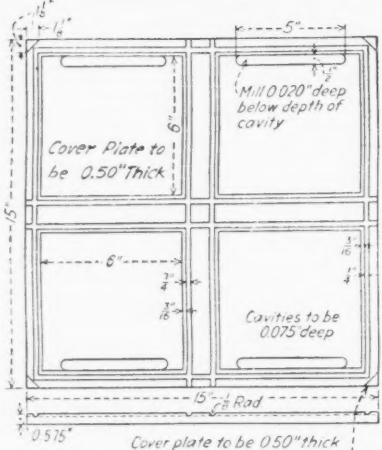
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up to 400 ounces per shot and time cycles as low as 90 seconds are being designed. The 400-ounce machine will have a maximum pressure of 30,000 p.s.i. on the material in the injection chamber operated with a four-inch diameter plunger, and a clamping pressure of 1,134 tons. The extruder pump will have a five-inch screw turning at 25-200 r.p.m. A unit of this type is electrically heated and fully automatic in operation.

Several American and European rubber manufacturers are showing keen interest in the new machine. A variety of tests has been conducted for several months in the company's laboratory press, and many tests on intricate molded parts have been completed. A large press for the manufacture of an automotive part in a two-cavity ring mold is in production. The molds are arranged one above the other so that the stock flows from the upper to the lower mold. With this arrangement, not only is production increased, but less clamping pressure and a smaller press area are required.

The new machine has already been accepted in the plastics industry where injection moldings of 64 ounces per shot have been made, and for which a machine of 100-ounce capacity is being built. All the important features of the 48-ounce model will be incorporated into the larger sizes. The 48-ounce machine has been designed to produce quality moldings on a fast cycle, while giving great reductions in initial cost and operating expense.

**Hand-Operated
Tester**

THE new Dillon hand-operated multi-low-range universal tester claimed to be the first entirely hand-operated physical tester in the 0-100 pound testing range, has been announced by W. C. Dillon & Co., Inc., Chicago 44, Ill. The tester has an accuracy of 0.5% and handles specimens in tensile, compression, transverse, and shear tests.

Four loading scales are shown on the dial indicator: 0-10 pounds in one-ounce divisions; 0-25 pounds in two-ounce divisions; 0-50 pounds in four-ounce divisions; and 0-100 pounds in eight-ounce divisions. Calibrations are offered in tenths of pounds, ounces, or kilograms, as desired. The tester is of the calibrated pendulum type, hand operated through worm and gear drive floated in ball bearings, with provision made for motorization at any later date. The indicator remains at the peak load after the specimen breaks until reset manually. Elongation readings are shown on a finely graduated scale mounted on one of the pressure columns.

The tester is supplied with one pair of grips for flat specimen up to 1/8-inch thick by 1 $\frac{1}{4}$ inches wide. A number of grips are available for specimens such as rubber, wire, wood, etc., and are easily interchangeable. The standard model has a daylight opening between the grips of 14-3/4 inches, and extra tall models can be supplied to give openings of 24, 36, and 48 inches. The machine weighs 85 pounds, has an overall height of 40 inches, and is attractively finished in chromium and gray crackle enamel.

THE TURKISH GOVERNMENT SEEMS INTERESTED IN GROWING rubber locally and to this end is said to have founded a National Rubber Institute. It seems that two groups of Turkish investigators are to be sent abroad to gather information on production of raw rubber.

INDIA RUBBER WORLD

EUROPE

GREAT BRITAIN

Problems Confronting the RABRM

At the twenty-ninth annual general meeting of the Research Association of British Rubber Manufacturers, held May 4 in London, President A. Healey, was again reelected for another year. The following were elected vice presidents: F. D. Ascoli, Dunlop Rubber Co., Ltd.; H. Berry, Leyland & Birmingham Rubber Co.; H. H. Burton, John Bull Rubber Co., Ltd.; Lieut.-Col. J. Sealy Clarke, George Spencer Moulton & Co., Ltd.; Sir H. Hartley; T. H. Hewlett, Anchor Chemical Co., Ltd.; A. Johnston, North British Rubber Co., Ltd.; F. G. W. King, Dunlop; R. W. Lunn, Leyland & Birmingham; F. E. Maguire, British Rubber Development Board; J. H. Mandelberg, J. Mandelberg & Co., Ltd.; H. E. Miller, Harrisons & Crosfield, Ltd.; T. H. Redfern, Redfern's Rubber Works, Ltd.; and D. F. Twiss.

In his speech the chairman, H. Rogers, stressed two points in the future research policy of the Association: first, the decision to set up panels of experts from the industry to advise on certain technological researches; second, the proposal to arrange for selected members on the research staff to work in the factories of member firms in developing results of RABRM laboratory work to the production stage. The aim was to keep RABRM research work as closely as possible in line with industry's needs and to insure that potentially useful results were developed promptly into something directly useful.

The chairman then discussed the Association's future, stressing two urgent problems—new buildings and finance. To carry out its enlarged research scheme the Association must have new buildings, which, it is estimated, might cost around £100,000, and, furthermore, there is the need of increased income.

Mr. Rogers also reminded members that in order to earn the government grant for the period 1949-1953, industrial income of the Association would have to be increased from the present £17,000 to at least £25,000. Furthermore, in applying for renewal of the grant, the Association had put forward a five-year plan which envisaged an industrial income of £45,000 as being "appropriate to an industry of the size and importance of the British rubber manufacturing industry." The problem of raising this enlarged income was now being carefully studied by the Association's council in consultation with the Federation of British Rubber Manufacturers' Associations.

Correction

In its issue of July, 1949, *Rubber Age & Synthetics*, London, justly takes issue with a statement occurring in a British news item on page 127 of our April, 1949, issue, reading:

"Another problem facing tire dealers is caused by the circumstance that under the present government's distribution plan every dealer must order a certain minimum quantity of tires per annum from each of the 13 tire manufacturers, and that all must be sold at the same price," and thus ascribing to the British Government the plan of the Tire Manufacturers' Conference.

By one of those unfortunate slips that sometimes occur, the word *government* was substituted for *conference*, for the sentence should have read:

"Another problem facing tire dealers is caused by the circumstance that under the present *conference* distribution plan every dealer . . ."

We thank our contemporary for calling this slip to our attention and regret any misunderstanding it may have given rise to.

Rubber Products for the Textile Industry

The textile industries of Britain need a continuous supply of rubber components such as pickers, cots, and aprons to keep their complicated machinery running at full capacity. It is therefore surprising, points out *The India Rubber Journal*, that during the last year England had to import considerable quantities of rubber goods for use on textile machinery because the home industry apparently was unable to supply articles of a satisfactory quality.

Americans seem to have been quick to appreciate the value of the market which exists within the textile industry and now



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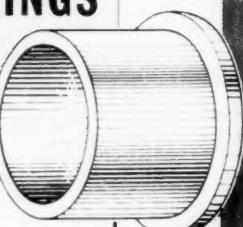
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- Full-rounds, halves or segments — to your blue prints.
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Will not float... Is not a greasy black

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produce components said to give excellent service. However, continues the journal, the present dollar shortage here makes the purchase of these components abroad an unjustifiable luxury, and it is therefore gratifying to learn that at least some British rubber manufacturers are now striving to produce a range of rubber textile parts equal or superior to the foreign articles.

1948—Record Year for Dunlop

The year 1948 proved a record one in production, sales, and profits earned, the chairman of Dunlop Rubber Co., Ltd., Sir Clive Baillieu, reported at the fiftieth annual meeting of the company. In agreement with government policy of disinflation, the company limited dividends to the level of the preceding year despite the high profits. However the carry-forward was increased to £1,391,000.

Referring to the progress of the company's various enterprises, the chairman said that despite the serious disturbances in Malaya, Dunlop Plantations produced a raw rubber crop 25% above that of 1947. During 1948 considerable progress was made in the replanting program which aims at increasing the budded rubber area from the present 50% to more than 75% of the planted area. Dunlop also has undertaken a large expansion of research work and facilities in Malaya and is developing new processes which are expected to be of great importance to the industry.

In England, Dunlop Cotton Mills was able to increase production; the tire division booked markedly higher sales to vehicle manufacturers and record sales in the replacement market. Dunlop golf balls continue to maintain their popularity.

At Fort Dunlop a new electrical gage has been developed for recording the thickness of rubber film on tire cord. The dials of the gage fitted on a calender central panel show the thickness of the rubber film continuously at four points with an accuracy of 0.0004-inch (four-tenths of a thousandth of an inch).

Progress in Scotland's Rubber Industry

Schemes to extend existing works in the rubber industry in Scotland progressed rapidly in 1948 and, when completed, will give employment to several hundred persons, the recent White Paper on "Industry and Employment in Scotland 1948" reveals. The big expansion program of the India Tire & Rubber Co., Ltd., Inchinnan, which was begun in 1946, is stated to be near completion and will result in a considerably increased production of tires in 1949.

At Thornliebank and Dunfermline, Dunlop Rubber Co., Ltd., is adapting buildings for the production of cotton and rayon material for use in its own manufacturing processes. Other schemes will increase the output of tires, footwear, conveyor belting, golf balls, hospital equipment, expanded rubber sheets, oilskins, water bottles, and tarpaulins.

James Anderson & Co. (Colors), Ltd., Glasgow, has opened a new factory at Paisley for the manufacture of special pigments for the rubber and other industries. Raw materials will be mainly Scottish coal-tar derivatives.

The press reports experiments in Edinburgh with a new railplane, the invention of George Bennie, of Glasgow, designed for transport from airports to cities. Rubber is understood to play an important part in the suspension system, and the results of a test to determine the relative merits of mild steel and synthetic rubber tires suggest that such tires may become part of the regular equipment of these railplanes. The new means of transportation is said to have a cruising speed of 120 miles an hour, with a maximum of 200 miles an hour, and is capable of carrying 50 passengers. Since the cars can be dispatched at intervals of one minute, this rate means a potential carrying capacity of 3,000 passengers an hour.

North British Rubber Co., Ltd., installed new tire machinery at the Castle Mills factory in Edinburgh, and the production of other rubber goods is being rapidly extended at the Heathhall Works, Dumfries.

At the recent annual meeting of North British Rubber the managing director, A. Johnston, complained of the delays caused by government red tape in equipping the company's new factory in Dumfries. Discussing tire business, Mr. Johnston stated that a decline in the demand for passenger-car tires caused the company to reduce output of this type of tire at the beginning of the year. Demand for heavy-duty tires, however, was still good, and export requirements were heavy. The shortage of dollars had turned consumers in many countries to tires from Sterling countries. In certain characteristically American sizes, he said, it was impossible to meet the demand from overseas markets which formerly bought these tires from the United States.

British Rubber Industry Notes

Tire exports fluctuated considerably in the first four months of 1949 to total, in value, £4,187,507. The year began with record shipments in January, representing a value of £1,235,109; in February it dropped to £907,465; in March it rose to £1,127,278, but in April exports seesawed back to £917,655.

Wheels which gain their resilience from the introduction of a rubber sandwich in the tire assembly have been fitted to new trains on the Southend-on-Sea pier railway. This application seems to be the first of these wheels to a light railway in England. The wheels were supplied by Crompton Parkinson, which manufactures them under license from the American concern, Transit Research Corp.

Much interest is being displayed, especially in rubber circles, in British proposals for one-rail trains, in which engines and carriages run on a single central rail; while stability is maintained by pneumatic-tired wheels arranged on either side of the train. These wheels are intended to run on smooth road tracks, which may be only a few feet wide, on either side of the rails. The greater part of the load is taken by the rail so that tires and side road tracks get comparatively little wear. The advantage of a system of this kind appears to be that it is relatively very cheap to lay and to maintain. The possibilities it offers for increased demand of tires and perhaps also for rubber-asphalt road tracks interest the rubber industry.

The council of the Institution of the Rubber Industry will award scholarships in rubber technology for the three-year associateship course of the IRI. These scholarships which have a value of £150 a year, will be tenable at the National College of Rubber Technology, Northern Polytechnic, London.

At the annual meeting of Anglo-Malay Rubber Co., Ltd., Eric Miller, chairman of Harrisons & Crosfield, pointed out that the rubber market had not been helped by the recent decision of the Dutch authorities in Indonesia to compel the sale to the United States of 50% of all rubber exported from Indonesia, in order to get dollars, as a result of which rubber is "being poured into America's lap, even on days when it is not particularly wanted."

The British Industries Fair, which closed May 13, reports a record number of foreign visitors. Overseas attendance, it is stated, was maintained at three times the prewar level. The country most strongly represented by overseas buyers was India, closely followed by the north European countries; then came South Africa and Australia. It was stated at least three times the pre-war number of American buyers were at the fair.

Seen at the British Industries Fair, in Birmingham: extremely light, rubber-reinforced fire hose, said to have three times the abrasion resistance of ordinary, unlined hose; flameproof vulcanizers intended for underground use; rubber-tired lawn-mowers. In London: special types of hot water bottles for children, including a series featuring animal figures; doll-size hot water bottles useful both as toys and for local application; inflatable rubber toy animals and animal balloons; plastic tiles and floorings; plastic-coated transmission belts.

GERMANY

Holds Plastics Conference

On April 21 and 22, the first conference of the Plastics Committee of the Chemical Technology Division of the Chamber of Technology, Berlin, took place. A number of experts in Berlin and the Eastern Zone attended. Professor Nitsche, of the Materials Testing Bureau, Berlin, opened the conference. The papers presented included: "New Results and Views on the Field of Polyvinylchloride Research," Dr. Seipold, Elektrochemisches Kombinat, Bitterfeld; "Production and Use of Polystyrene," Hild, Chemische Werke Buna, Schkopau; "Problems in the Production and Working up of Polyamides," Professor Voss, Wolfs Film factory; "Present State of the Manufacturing Technique and Properties of Dicyandiamide Molding Materials," Dr. Hey, Stickstoffwerk, Pieseritz; "State of German Work on Standardization in the Plastics Field," Professor Nitsche; "Solvability Determination to Identify High Molecular Substances," Dr. Toeldte, Materials Testing Bureau; "Old and New Methods of Testing Molding Materials," Dr. Motzkus, Materials Testing Bureau; "Present Situation in the Yelding of Plastics," Voigt, Schweiss-technische Lehr-und Versuchsanstalt, Halle; "Experience in the Use of Vinidur for the Construction of Piping and for Linings," Hermeling, Chemische Werke Buna.

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In the course of his address Dr. Seipold reportedly stated that the Soviet Zone now was the leading producer of Polyvinylchloride, and probably ahead of the United States.

German Rubber Trade Notes

The authorities in Western Germany have limited the amount of styrene that may be produced in Germany to 20,000 tons annually. Styrene is used in the production of certain types of Buna and as basis for synthetic plastics.

The German press notes that as a result of the cessation of deliveries from the Western Section of Germany, a large number of mechanical goods made from synthetics and formerly obtained from this sector are now being manufactured in Sachsen-Anhalt. Included among these articles are driving belts of Igelit (polyvinyl chloride), production of which is to be considerably increased in the course of this year. At present about 150 factories in Sachsen-Anhalt are engaged in making plastics, giving employment to about 2,200 persons.

In the Eastern Zone the Oranienburg carbon black works is said to have raised output of blacks to an average of 50 tons a month, about twice the 1947 rate. It is planned to produce at least 60 tons a month during 1949. Most of the carbon black is intended for the rubber industry, and the rest for printing inks.

Before the war German lithopone factories had a combined productive capacity of 100,000 tons. The greater part of the output is produced by three factories in the British Zone: Homberg works of the Sachtleben A. G., the Farbenfabriken Bayer in Leverkusen and the A. G. for Chemical Industry in Gelsenkirchen-Schake. The first two factories produced about 60% of total before the war; now their output is about 3,500 to 4,000 tons a month.

FRANCE

Statistics for First Quarter, 1949

In the first quarter of 1949 the French rubber manufacturing industry consumed 26,678 metric tons of natural and synthetic rubber, against 24,779 tons in the same period of 1948. Of these amounts, 17,127 and 15,292 metric tons, respectively, were used by the tire industry, with 12,156, against 10,600 metric tons, going into automobile tires. In the 1949 quarter the tire industry used very little synthetic rubber; 95% of the total quantity consumed was natural rubber; only in the production of automobile tubes was synthetic rubber used to any appreciable extent, specifically, 41%.

For other rubber manufacturers, 9,551.4 metric tons, including 85% natural rubber, were used compared with 9,487 tons in the 1948 period. The products and the amounts of rubber used (in metric tons) in their manufacture included among the rest:

	First Quarter, 1949	First Quarter, 1948
Mechanical Rubber Goods	1,700	1,596
Electric Cables	1,297	1,209
Footwear	1,268	1,003
Soles and Heels	1,071	1,550
Hose and Belting	1,513	1,590
Sponge and Cellular Rubber	392	304
Surgical and Sanitary Goods	271	339
Toys and Sporting Goods	225	296

Rubber Masks

Two interesting examples of the use of rubber in molded masks are shown in a recent issue of *Revue Générale du Caoutchouc*.¹ In the first case it was necessary to make a casting of the head of an actor playing a role in a French film that called for grotesquely comical facial contortions risky to achieve in the flesh. A plastic cast was therefore made of the actor's head, and from this again a casting in latex sponge sufficiently flexible to permit production of the desired distortions by mere manual pressure.

In the second instance a latex, heat-sensitized with trypsin, was used to make a head for a movable figure for use in advertising a dentifrice, and the mechanically induced expressions of the face are said to be astonishingly life-like.

¹ July, 1949, p. 480.

EUROPEAN NOTES

Acrylic resins have reportedly been produced since 1945 from lactic acid by the Industria Chemica S.A.D.A.F., Milan. It seems that the output includes 2,000 kilograms daily of aqueous polymethacrylate emulsions, in addition to material in solid form or dissolved in organic solvents. The products are marketed under the names, Acrisol and Acrigel. At present the shortage of lactic acid at reasonable prices is a difficulty caused by the circumstance that the only sizeable lactic acid plant in Italy was destroyed in the war. However it is held that under normal conditions it would be cheaper to produce acrylic resins in Italy from lactic acid than by using ethylene as base.

It is reported that a rubber goods factory in Czernowitz (formerly Polish, now Russian territory) recently began mass production of rubber galoshes and rubber boots.

Norway is soon to have its first factory manufacturing polyvinyl chloride. The Heroya Elektrokjemiske Fabrikker at Skien, is reportedly entering this new field of production, and an output of 1,000 metric tons annually is expected.

AFRICA

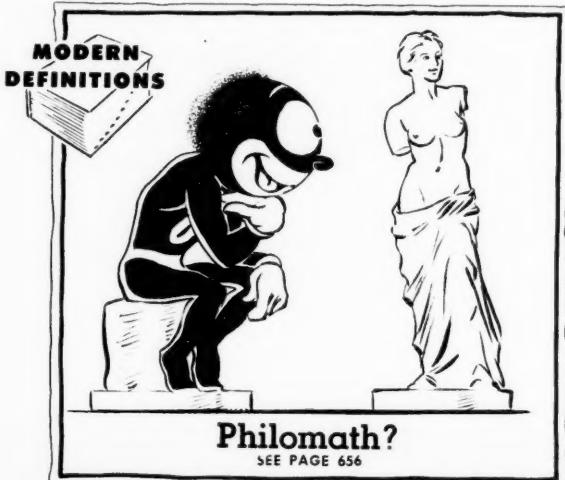
The Government of the Union of South Africa has prohibited the importation of a large number of manufactures, also of rubber, including heels and soles, rubber footwear (except infants' sizes and surgical boots and shoes), rubber hose, floor mats, and pneumatic tires and tubes.

It will now be up to local manufacturers to increase production to meet the expected increase in demand for domestic products.

At a meeting of the General Tire & Rubber Co. (S.A.), Ltd., held in Johannesburg, the chairman pointed out that the company's tire factory at Port Elizabeth, which recently started production, was planned for an output of about 60,000 tires and a proportionate number of tubes and repair material, and equipment had been installed to produce these amounts. As a consequence of the recently imposed currency and import controls, it now becomes necessary to provide for an increase in output at least $2\frac{1}{2}$ times over that originally envisaged. Fortunately the buildings were designed for expansion so that only additional machinery will have to be imported.

A Johannesburg firm has reportedly begun the manufacture of hot water bottles, the first to be produced here, it seems. Output is expected to be 4,000 a month to begin with, but will be doubled when full production is reached.

Rubber production in Liberia has risen from 2,371 long tons in 1937, to 20,835 long tons in 1947; output for 1948 is estimated at 21,315 long tons. Most of this rubber comes from Firestone's 80,000-acre plantation. There are a number of small plantations in Liberia with a total area of perhaps 10,000 acres, but their output naturally is not a significant factor in the country's production of rubber.



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Editor's Book Table

BOOK REVIEWS

"Frontiers in Chemistry." Volume VI. High Molecular Weight Organic Compounds. Edited by R. E. Burk and Oliver Grummitt. Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. Cloth, 6 by 9 inches, 340 pages. Price, \$5.50.

Published under the auspices of Western Reserve University, this sixth volume of the "Frontiers in Chemistry" series is based on lectures presented at the University, with additional material to bring the coverage up through 1947. Six sections constitute the book: "Polymerization in Suspension and Emulsion," Walter P. Hohenstein and H. Mark; "Osmometry and Viscosity of Polymer Solutions," W. J. Badgley and H. Mark; "The Nature of Elastomers," Harry L. Fisher; "Aspects of the Structure and Reactions of Proteins," John T. Edsall; "Condensation Polymerization and Constitution of Condensation Polymers," Paul J. Flory; and "Physical and Chemical Structure of Phenoplasts," T. S. Carswell. Each of these sections is further subdivided into chapters. Comprehensive bibliographies conclude each section, and an adequate subject index is appended to the book.

"Photography in Engineering." C. H. S. Tupholme. Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. Cloth, 5 $\frac{1}{2}$ by 8 $\frac{1}{2}$ inches, 290 pages. Price, \$6.50.

This is the first American edition of a book which fills a gap in the literature by presenting in one volume many of the applications of photography in engineering. The book comprises eight chapters, as follows: photography of drawings and documents; photography in the laboratory; high-speed photography; radiography; X-ray and electron diffraction and microradiography; processing and storing X-ray material; infra-red photography; and instructional motion pictures.

Although emphasizing British equipment, adequate mention is made of American photographic equipment, and much of the foreign machinery is available in American counterparts. The presentation is extremely detailed and thorough and will be found valuable by students in addition to practicing engineers. Although only a few specific applications are covered in each chapter, each application is typical of many and with slight variations in technique can be adapted for many similar purposes.

"Trade Marks." H. Bennett. Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. Cloth, 5 $\frac{1}{2}$ by 8 $\frac{1}{2}$ inches, 486 pages. Price \$10.

The importance of a good trade mark in the merchandising of a product is readily acknowledged, and the value of this book which outlines the principles of trade mark selection will be therefore apparent. Legal aspects of trade marks, covered in the first section of the book, include rules of practice and forms for trade mark cases, the Lanham Act, court decisions, qualification of trade marks, British legal requirements, registration procedure, and protection of trade marks abroad. The second section deals with the coining of trade marks and gives much useful information on types, selection, and surveying the field of trade marks. Included are four sets of movable concentric disks, called Name Finders, which can be used to build up different types of names. The third and final section contains extensive lists of trade marks classified according to meaning, industry, owners, and compositions.

NEW PUBLICATIONS

"Census of Manufactures—1947. Electrical Appliances and Lamps; Insulated Wire and Cable; and Engine Electrical Equipment." 8 pages. United States Department of Commerce, Bureau of the Census, Washington, D. C. For sale by Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 10c. Important statistics are given for the above three industries with regard to production, cost of materials, value of products shipped, number of employes, and salaries paid. Statistics include national totals and divisions by state, industry, and size of establishment.

Publications of Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. **"The Evaluation of Carbon Blacks in Natural and Synthetic Rubbers."** F. H. Amon and E. M. Dannenberg, 20 pages. Laboratory processing and physical test data on 10 brands of carbon black are given in natural rubber and in standard, 41° F., and 14° F. GR-S. The results of tests on the different blacks are averaged for all rubbers and summarized in tabular form.

"Cabot Carbon Blacks in Polyethylene." 4 pages. Information is offered on the Cabot black which produces the jettest black polyethylene film, the percentage loading of black needed, the effect of various black loadings, and the recommended black dispersion technique. **"Cabot Carbon Blacks in Butyl Tube Stocks."** 8 pages. Formulations and test data show the effects of various Cabot blacks in Butyl tube stocks. Best results are shown to be obtained with Sterling SO and Vulcan 1.

"Cabot Reinforcing Carbon Blacks for Rubber." 60 pages. Comprehensive test data in table and graph form show the effects of seven different Cabot blacks in natural rubber, GR-S, and neoprene. Physical test results include tensile, modulus, elongation, hardness, tear resistance, T-50 values, torsional hysteresis, rebound, and angle abrasion loss.

"Nonyl Phenol." Bulletin No. C-9-125, July, 1949. Koppers Co., Inc., Pittsburgh 19, Pa. 15 pages. The properties, chemical reactions, and uses of nonyl phenol, an alkylated phenol, are described in this bulletin. The chemical is said to be an intermediate for the production of rubber chemicals, plasticizers, surface active agents, oil-soluble phenolic type resins, and other materials.

"Vistanex Tank Linings." Bulletin BV-1, July 15, 1949. Enjay Co., Inc., 15 W. 51st St., New York 19, N. Y. 5 pages. Information appears on the formulation, processing, application, and properties of Vistanex tank linings. Polymeric materials such as polyethylene or Piccolastic D-75 aid in processing, and Vistanex compounds containing these materials have good physical properties and chemical resistance.

Publications of Monsanto Chemical Co., St. Louis, Mo. **"Lustrex X-810 as a Thickener for Various Resin Emulsion Systems."** 2 pages. Information appears on methods of preparing aqueous alkaline solutions of Lustrex X-810 for use as thickening agents, and data are given on thickening effect obtained with these solutions in various types of resin latices.

"Monsanto Chemicals and Plastics." Twenty-Eighth Edition, 148 pages. This edition of the catalog describes the company's facilities and services, lists the industries served by its products and also the properties and uses of each of its many chemical and plastic products. A general data section is appended giving test methods, conversion data, specific gravity tables, and other useful information.

"Neoprene Type S in Neoprene Compounds for Low Temperature Service." BL-232, July 1, 1949. E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 2 pages. The use of substantial proportions of Neoprene Type S is recommended to improve markedly the processing properties of general-purpose neoprene stocks containing large amounts of ester plasticizers. Lower brittle points can be obtained by this method, which makes practical the use of increased amounts of plasticizer.

"Indonex Plasticizers in Semi-Ebonite Compounds." Circular No. 13-35 June 30, 1949. Indol Chemical Co., 910 S. Michigan Ave., Chicago 80, Ill. 4 pages. Formulations and extensive test data, including oil and water immersion studies, show the suitability of Indonex 638 $\frac{1}{2}$ in different types of semi-ebonites made from GR-S-50 and Hycar OR-25.

"L'Institut Français du Caoutchouc et l'Institut des Recherches sur le Caoutchouc en Indochine." May, 1949. 40 pages. The history, scope, and aims of the rubber research institutes in France and Indo-China are described briefly, and members of their councils and working committees and of international affiliations listed. The various activities of the institutes are shown in 17 full-page illustrations including views of the lecture rooms, library, laboratories, and apparatus in the buildings of the I.F.C., and of research laboratories, rubber plantation, coolie village, and director's house at the Indo-China Rubber Research Institute's station at Laikhe. A list of publications of members and associate members and a diagrammatic representation of French rubber institutes, their affiliations at home and abroad, and the scope of their activities conclude this issue.

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"**Barrett Aromatic Industrial Solvents.**" Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 50 pages. This booklet treats of the uses, specifications, properties, and testing methods for Barrett's industrial aromatic solvents. Both typical and new uses for the different solvents are given, besides many typical formulations. Large charts show some of the better known derivatives of benzol, toluol, and coal.

"**Golden Anniversary, Packard Motor Car Co.**" Packard Motor Car Co., Detroit, Mich. 16 pages. Prepared by The B. F. Goodrich Co. as a tribute to Packard on its fiftieth anniversary, this handsome illustrated booklet describes the growth of the motor company and its present position and car models and reviews Packard's wartime assignments in engine production during both world wars.

Bulletins of M. W. Kellogg Co., Jersey City 3, N. J. "**Kel-F Physical and Mechanical Properties.**" Technical Bulletin #1-1-49. 4 pages. Extensive data on chemical, physical, thermal, and electrical properties of Kel-F are shown in tables and graphs. "**Kel-F Modification of Properties by Heat Treatment.**" Technical Bulletin #2-1-49. 2 pages. Methods of heat treatment are described, and data given on the effect of such treatment on the hardness, chemical resistance, and dimensional stability of the plastic. "**Kel-F Molding Techniques.**" Technical Bulletin #3-1-49. 7 pages. This illustrated bulletin offers full information on molding Kel-F sheets without a die, and on molding the plastic by compression, extrusion, injection, and transfer molding techniques.

"**Brookfield Synchro-Lectric Viscometer.**" Brookfield Engineering Laboratories, Stoughton, Mass. 8 pages. This illustrated bulletin presents complete information on the design characteristics, applications, and advantages of the Brookfield viscometer. Available in four models, the instrument is finding increasing acceptance in the latex field for viscosity measurement.

"**The Sunproofs, Inhibitors of Atmospheric Cracking.**" Compounding Research Report No. 12, Naugatuck Chemical Division, United States Rubber Co., Rockefeller Center, New York 20, N. Y. 12 pages. In addition to information on the physical and compounding properties of the Sunproofs, data appear on their use in tire sidewall, mechanical goods, and wire jacketing compounds, plus photographs of results obtained.

"**Davenport Continuous Press.**" Davenport Machine & Foundry Co., Davenport, Iowa. 24 pages. The company's line of continuous presses for mechanical extraction of water is illustrated and described in detail. Photographs of typical applications include their use in synthetic and reclaimed rubber plants for dewatering prior to final drying.

Data sheets of Golden Bear Oil Co., Los Angeles 14, Calif. "**Califlux TT.**" 2 pages. Data on composition, properties, compounding characteristics, availability, and prices are given for Califlux TT, a new sulfur-reactive plasticizer especially recommended for use in cold rubber. "**G. B. Naphthenic Neutrals.**" 2 pages. Data presented cover properties and uses of four grades of Naphthenic Neutrals, mixtures of naphthenic hydrocarbons for use as internal lubricants and processing aids. "**G. B. Asphaltenes.**" 2 pages. This solution of asphaltenes in naphthenic unsaturated hydrocarbons is recommended as an extender for GR-S containing both high and low loadings.

"**If It's a Job for Adhesives, Put It Up to Paisley Scientific Adhesive Service.**" Paisley Products, Inc., Chicago 16, Ill. 6 pages. The company's basic adhesives are described, together with a product list showing end-uses and industries served. Illustrations show different stages in manufacture and control of adhesives, and typical applications. The company's free consulting service to adhesive users is also outlined.

"**Health Hazards in the Chloroprene Industry and Their Prevention.**" A. E. Nyström, *Acta Medica Scandinavica*, No. 132, Supplement No. 219, 125 pages, Stockholm, Sweden (1948). "**Baskets, Hamps & Trucks.**" C. R. Daniels, Inc., Daniels, Md. 24 pages. "**List of Inspected Electrical Equipment.**" May, 1949. 458 pages. "**Bi-Monthly Supplement to All Lists of Inspected Appliances, Equipment, Materials.**" June, 1949. Underwriters' Laboratories, Inc., 207 East Ohio St., Chicago 11, Ill. 68 pages. "**Flammables Self-Checking Chart.**" File No. 1320. The Protectoseal Co., 1920 S. Western Ave., Chicago 8, Ill. 12 pages.

INDIA RUBBER WORLD

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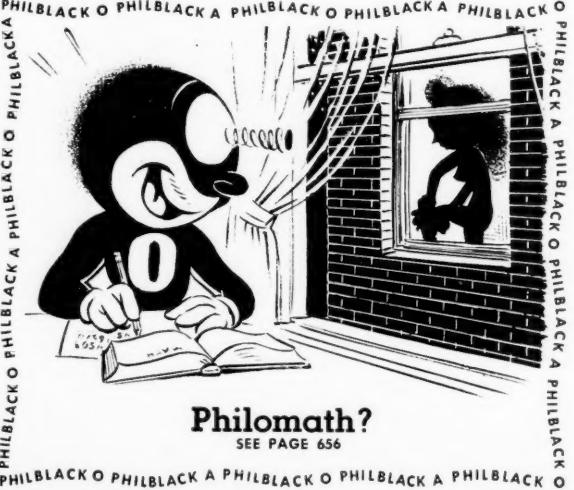
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Philomath?

SEE PAGE 656

September, 1949

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Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

No. 1	June	July	Aug.	Aug.	Aug.	Aug.
Contract	25	30	6	13	20	27
Oct.	16.30	16.19	16.00	16.49	16.48	16.74
Dec.	16.20	16.05	15.80	16.25	16.20	16.44
Feb.	15.97	15.92	15.67	16.08	16.08	16.29
Apr.	15.80	15.78	15.53	15.92	15.92	16.13
June	15.70	15.65	15.40	15.80	15.80	16.00
Aug.	15.60	15.55	15.30	15.70	15.70	15.90
Total weekly sales, tons	3,470	4,280	4,980	5,300	8,190	4,660

After dipping during the first week of August, rubber futures prices on the Commodity Exchange moved irregularly upward the balance of the month. This advance was attributed to a shortage of top-grade nearby rubber, an increase in factory buying, and firmness on the London and Singapore markets, which reported heavy buying from Russia and the Continent.

Trading was active on the Exchange, with much switching out of the September contract into more future months because of the probability of a squeeze in September resulting from the shortage of top-quality rubber. Most of the irregularity in prices arose from rumors of Sterling devaluation, which caused waves of liquidation. These depressing factors were counteracted by new buying based on the physical market and the other bullish factors mentioned above.

On August 16 the ECA announced that it had bought 21,000 long tons of crude rubber on the London market. The purchases amounted to \$8,400,000 and were paid for with ECA counterpart funds.

October futures opened the month at 16.12c, dipped to 15.89c on August 3, then rose to close the month at the high of 17.20c. December futures began at 16.00c on August 1 and rose to the high of 16.75c on August 31. The active tone of the market was reflected by the monthly total sales volume of 25,450 tons, as compared with 19,550 tons sold during July. This August sales total was the highest since the March, 1948, figure of 26,230 tons.

York market is actually cheaper than the Far Eastern markets. According to some trade sources, all that rubber needs to consolidate its gains and move forward is a renewal of buying by the government for stockpile purposes.

After starting the month at 16.25c, the spot price for No. 1 Sheets dropped to 16.00c on August 3, then rose irregularly to close the month at the high of 17.25c. No. 3 Sheets showed corresponding movement, although at a 2c differential, and closed at 15.25c on August 31. No. 2 Brown rose from 14.00c to a high of 14.75c on August 31. Flat Bark prices dropped to 11.50c, then rose to a high of 12.13c on August 15, and again on August 31.

Latices

Stocks of *Hevca* latex, estimated at 8,177 long tons dry weight, at the end of June represent only about 234 months' supply at present consumption rates, a new low for peacetime supplies, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's August *Rubber Report*. Mr. Nolan gives estimated figures for *Hevca* latex in June as follows: imports, 2,180 long tons; and consumption, 2,908 long tons. While foam continues to be the major use of latex, there is strong improvement in other lines, particularly adhesives and coatings.

The price of *Hevca* latex took its expected cut early in August when bulk prices declined to 25-27.5c a pound, and on August 11 certain prices were reduced to 23.5-25c a pound. At 23.5c a pound of solids, *Hevca* latex is now in a strong price position to challenge GR-S latex in applications where the latter material has enjoyed a price advantage.

There are still some 1,500 long tons a month of GR-S latex used either because of its technical merits or its lower price. At the new low price of *Hevca* latex, a truer assessment of comparative qualities of *Hevca* and GR-S latices can be expected to be made. Production of GR-S latex during June was 1,971 long tons, dry weight, and bulk prices remain unchanged at 18.5-20.25c per pound.

New York Outside Market

WEEK-END CLOSING PRICES

June	July	Aug.	Aug.	Aug.	Aug.
25	30	6	13	20	27
No. 1 R. S. S.					
Aug.					
Sept. 16.50	16.25	16.25	16.20	16.38	16.88
Oct.					
Dec. 16.38	16.25	16.00	16.30	16.38	16.88
No. 3 R.S.S. 14.88	14.25	13.88	14.50	14.38	14.88
No. 2 Brown 14.50	14.13	14.00	14.38	14.13	14.50
Flat Bark 12.00	11.75	11.63	11.88	11.75	12.00

PHYSICAL rubber prices on the New York Outside Market during August showed an upward trend corresponding to movement in rubber futures prices. A noteworthy increase in factory buying took place, although mainly for the cheaper grades of rubber for delivery in March and May. Trade observers believe this buying to be a definite renewal of interest by factories after realizing that the New

SCRAP RUBBER

DEVELOPMENTS in scrap rubber during August were lacking as dealers reported the market to be very quiet. Vacation schedules among mills tended to cut activity, and no change in the market is expected until September. The little business which did take place consisted of small shipments confined to tires and tubes. Some export business was noted, but only in small volume. The market dullness was reflected in a drop in price of red passenger tubes from 7.5c to 7.0c a pound both at Akron and in the East.

Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at points indicated:

Eastern Points	Akron O.	(Per Net Ton)
Mixed auto tires	12.50	\$13.50
Peelings, No. 1	32.25	52.25
3	30.25	30.25
		(per lb.)
Black inner tubes	4.00	4.00
Red passenger tubes	7.00	7.00

RECLAIMED RUBBER

SHIPMENTS of reclaimed rubber during August showed a sharp increase, with sales estimated at approximately 70% above the July level. This increase was surprising in view of continued vacations at many of the consuming plants and the customary summer dullness. Among the factors believed responsible for this upswing were the reductions in reclaim prices announced in July and increased production of tires by rubber manufacturers.

Final May and preliminary June statistics on the domestic reclaimed rubber industry are now available. In May, production totaled 18,184 long tons; consumption, 18,323 long tons; exports, 887 long tons; and month-end stocks, 32,326 long tons. Preliminary figures for June give a production of 18,833 long tons; consumption, 19,355 long tons; exports, 694 long tons; and month-end stocks, 30,828 long tons.

There were no changes in reclaimed rubber prices during August; current prices follow:

Reclaimed Rubber Prices

Sp. Gr.	per lb.
Whole tire	1.184-2.20
Peel	1.18-1.20
Inner tube	
Black	1.20-1.22
Red	1.20-1.22
GR-S	1.18-1.20
Butyl	1.16-1.18
Shoe	1.50-1.52

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

June	July	Aug.	Aug.	Aug.	Aug.	
Futures	25	30	6	13	20	27
Oct.	29.38	29.73	29.70	30.00	29.85	29.86
Dec.	29.26	29.65	29.62	29.98	29.87	29.80
Mar.	29.14	29.61	29.60	29.93	29.93	29.68
May	29.04	29.50	29.50	29.81	29.76	29.02
July	28.43	28.93	28.98	29.08	29.15	27.26
Oct.	26.08	26.77	27.05	27.20	27.32	27.14

PRICES were spotty on the New York Cotton Exchange during August, with spot cotton continuing the steady decline begun at the end of June. Trading was only moderate in volume, with much hedging and professional selling. The more distant months held firm in view of renewed mill buying and reports of weevil infestation of the cotton belt. Foreign fixing remained light, and most ECA nations appeared to be awaiting the results of the British-American currency talks in September.

The spot price for 15/16-inch middling

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As a result of changes in manufacturing plans, a nationally-known company with plants in several cities has decided to dispose of its West Coast compound facilities. It therefore offers its virtually new, completely equipped compound plant, of medium size, for sale or lease. The building of reinforced concrete houses all the latest compounding facilities, in excellent condition and very little used:

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cotton started the month at 32.58c, then fell irregularly to close the month at the low of 31.43c. October futures began at 29.67c on August 1, rose to a high of 30.95c on August 15, then fell off to close at 29.88c on August 31.

Fabrics

An improvement in sales of wide industrial cotton goods was noted last month, and fall prospects appeared bright, with reports of continually rising demand for many constructions. Coating fabrics continued their strong trend of recent months at firm price levels. Hose and belting ducks were in slowest demand of all industrial types despite price reductions of 2c a pound. Numbered and army ducks moved actively, as did the wide ducks, drills, and twills.

Chafers moved quietly, with September contracts made at unchanged prices. Osnaburgs were inactive since most producers were reluctant to sell ahead at current prices owing to fear of rising raw cotton costs. Sheetings were moderately active, and all prices were firm; while printcloths stiffened in view of a tightening supply situation. Raincoat fabrics enjoyed moderate business, with prospects for increasing demand in the fall.

Current prices for cotton fabrics are listed below:

Cotton Fabrics

Drills		
59-inch 1.85-yd.	yd.	\$0.355/\$0.37
2.25-yd.		305.33

Ducks

38-inch 1.81-yd. S. F.	yd.	.425
2.00-yd. D. F.	yd.	30.31
51.5-inch 1.35-yd. S. F.	yd.	.46
66-inch 1.02-yd. S. F.	yd.	.73

Hose and belting

Hose and belting	yd.	.60
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Osnaburgs

40-inch 3.65-yd.	yd.	1325/135
------------------	-----	----------

Raincoat Fabrics

Bomazine, 64 x 60 5.35-yd.	yd.	.195
Print cloth, 38 1/2 inch, 64 x 60	yd.	.14.145
Sheeting, 48-inch, 4.17-yd.	yd.	.23
52-inch 3.85-yd.	yd.	.2488

Chafers

14-oz./sq. yd. Pl.	lb.	.66
11-65-oz./sq. yd. S.	lb.	.69
10-80-oz./sq. yd. S.	lb.	.62
8.9-oz./sq. yd. S.	lb.	.635
14-oz./sq. yd. S.	lb.	.59

Other Fabrics

Headlining, 59-inch 1.35-yd, 2-ply yd.	.565
64-inch 1.25-yd. 2-ply	.6063
Sateens, 55-inch 1.32-yd.	.57
58-inch 1.21-yd.	.6238

Tire Cords

K. P. std., 12-3-3	lb.	.685
12-4-2	lb.	.675

RAYON

PRODUCERS of rayon tire cord predict a tight supply picture for such cord in 1950 as the result of expanding consumption by tire manufacturers. Tire producers will most certainly have disposed of their cotton yarn inventories by next year, it was said, and unless the American economy should collapse, tire manufacturers' preference for rayon cord and the limited yarn production facilities available will mean an exceedingly tight supply of rayon cord next year.

Rayon filament yarn output in the second quarter of 1949 totaled 176,600,000 pounds, a decline of 19% from the first quarter. However production of high-tenacity viscose yarn, mainly used in tires, attained a new quarterly record of 74,500,000 pounds, an increase of 6% over the

first-quarter output. The reduction in total output of yarn was occasioned by sharp drops in production of intermediate and regular tenacity viscose and cupra yarn and acetate filament yarn.

Shipments of rayon filament yarn in the second quarter of 1949 to producers of tires and related products totaled 71,900,000 pounds, an increase of 4,900,000 pounds over the first quarter. The average denier of this yarn was 1499, as compared with 1492 during the previous quarter.

No changes occurred in rayon tire yarn and fabric prices during August, and current prices are listed below:

Rayon Fabrics

Tire Yarns		
1100/480		\$0.55
1100/490		.55
1150/490		.55
1650/720		.54
1650/980		.54
1600/680		.54
2200/960		.53
2200/980		.53
4400/2934		.55 / .56
Tire Fabrics:		
1100/490/2		.67
1650/980/2		.645 / .66
2200/980/2		.63

Financial

(Continued from page 732)

Baldwin Rubber Co., Pontiac, Mich. Year ended June 30: net profit, \$854,100 equal to \$2.17 each on 393,689 capital shares, against \$656,870, or \$1.67 each on 393,762 shares, in the preceding fiscal year.

Raybestos-Manhattan, Inc., Passaic, N. J., and domestic subsidiaries. Half ended June 30: net profit, \$830,849, equal to \$1.32 each on 628,100 capital shares, compared with \$1,135,456, or \$1.80 a share, a year earlier; federal tax provisions, \$652,000, against \$957,500.

Timken Roller Bearing Co., Canton, O. Half ended June 30: net profit, \$4,163,387, equal to \$1.72 a share, against \$7,622,033, or \$3.15 a share, in the 1948 period.

United States Rubber Co., New York, N. Y. Initial six months, 1949: net earnings, \$6,655,010, equal to \$2.30 a common share, against \$10,889,643, or \$4.70 a share, in the 1948 half; net sales, \$258,302,914, against \$278,120,805.

New Incorporations

Fabricated Rubber Sales Corp., New York, N. Y. Capital, 200 shares no par value. Incorporator, William Mason, Jr. Commission merchants and selling agents.

LeGras & Sherman Co., Visalia, Calif. Incorporators, Jack LeGras and Fred Sherman. To operate the former Uhl Rubber Co.

Premium Pencil Co., Inc., 60 Vernon Ave., Mt. Vernon, N. Y. Capital, 200 shares, no par value. Incorporator, S. Ashmann, 60 Vernon Ave., Mt. Vernon. To manufacture lead pencils, pens, and erasers.

Trade Marks

(Continued from page 740)

509,163. Coronet. Golf balls. Ryden Golf Co., Inc., Warren, R. I.	
509,194. Coronado. Golf balls. Ryden Golf Co., Inc., Warren, R. I.	
509,195. Corsair. Golf balls. Ryden Golf Co., Inc., Warren, R. I.	
509,117. Surex. Sanitary belts. R. L. Rank, doing business as Surex Mfg. Co., Inc., St. Louis, Mo.	
509,132. Hispire. Hose. Quaker Rubber Corp., Philadelphia, Pa.	
509,133. Ironides. Belting, hose, and diaphragms. Quaker Rubber Corp., Philadelphia, Pa.	
509,136. Cyclops. Belting and hose. Boston Woven Hose & Rubber Co., Cambridge, Mass.	
509,198. Representation of a circle containing the letters: "KS" between the words: "Super Flex." Tires. Kelly-Springfield Tire Co., Cumberland, Md.	
509,245. Brammer. Driving belts. H. Brammer & Co., Ltd., Leeds, England.	
509,210. Rings Guard. Footwear. Freeman Shoe Corp., Beloit, Wis.	
509,213. Seal-Tex. Vinyl coated rayon pieces. J. W. Valentine Co., Inc., New York, N. Y.	
509,214. Elephant Brand. Tire chains. Nixdorff-Krein Mfg. Co., St. Louis, Mo.	
509,229. Representation of a rectangle containing another rectangle. Friction elements for brakes, belts, hose, and couplings. American Brake Shoe Co., New York, N. Y.	
509,247. Representation of a bird and the words: "Rhythm Step The 1, 2, 3 Shoe." Footwear. Johnson, Stephens & Shinkle Shoe Co., St. Louis, Mo.	
509,274. Blanchard. Grinding machines. Blanchard Machine Co., Cambridge, Mass.	
509,283. Luster-bryte. Wax finish for rubber floors. U. S. Sanitary Specialties Corp., Chicago, Ill.	
509,299. Bone-Dry. Footwear. Bone Dry Shoe Mfg. Co., Tacoma, Wash.	
509,342. Parmole. Coated and waterproofed cloth. Joanna Western Mills Co., Chicago, Ill.	
509,355. Another Morris Wolock Fashion. Footwear. Morris Wolock, New York, N. Y.	
509,356. Toe Saver. Boots. Goodall Rubber Co., Trenton, N. J.	
509,371. Resiloid. Waterproof piece goods. Resiloid Corp., Brooklyn, N. Y.	
509,373. Rajah. Spark plug rubber safety nipples. Rajah Co., Bloomfield, N. J.	
509,391. Seventeen. Footwear. Miles Shoe Inc., New York, N. Y.	
509,400. Raifilm. Plastic film. Rainwear Toscano Fabrics, Inc., New York, N. Y.	
509,423. Roehlad. Wire and cable. John A. Roehling's Sons Co., Trenton, N. J.	
509,424. Roeprene. Wire and cable. John A. Roehling's Sons Co., Trenton, N. J.	
509,425. Roeweld. Wire and cable. John A. Roehling's Sons Co., Trenton, N. J.	
509,431. Vinopax. Plastic waterproofed cotton fabrics. W. L. Mellor, doing business as the W. L. Mellor Co., Kansas City, Mo.	
509,443. Representation of a globe containing the letter: "A" and the words: "Atlas Grip-Safe Cushionaire." Tires. Atlas Supply Co., Newark, N. J.	
509,445. The word: "Armorbubber" above a straight line. Tires. Kelly-Springfield Tire Co., Cumberland, Md.	
509,462. U-Sement. Liquid adhesive. United States Rubber Co., New York, N. Y.	
509,544. Ophilite. Sheet and ingot plastic material. A. F. Parmelee, doing business as United States Safety Service Co., Kansas City, Mo.	
509,559. Emulphogene. Stabilizers for emulsions of rubber. General Dyestuff Corp., New York, N. Y.	
509,551. Adjust-Arch. Arch supports. Scholl Mfg. Co., Inc., Chicago, Ill.	
509,552. Representation of a nursing bottle nipple and the words: "No Colic Nipple." Nursing bottle nipples. Davidson Rubber Co., Boston, Mass.	
509,560. Larco. Adhesive. Western Mineral Products Co., Minneapolis, Minn.	
509,563. Solid Comfort. Trusses. Ohio Truss Co., Cincinnati, O., now by change of name, Surgical Appliance Industries, Inc., a corporation of O.	
509,585. Halleo. Wax for compounding rubber. C. P. Hall Co., Akron, O.	
509,591. Jiblo. Tire tools. Hewitt's Inc., Medicine Lodge, Kans.	
509,609. Vee Flex. Packing rings. Raybestos-Manhattan, Inc., Passaic, N. J.	
509,610. V-Flex. Packing rings. Raybestos-Manhattan, Inc., Passaic, N. J.	
509,618. Representation of a triangle containing the words: "Jostam Mfg. Co., Peotone, Ill." and above which are the words: "All Rubber Slip On." Recoil pads. Jostam Mfg. Co., Peotone, Ill.	

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TYPE



The wide range of viscosities which this dissolver will handle, together with a variety in design of the agitator, provides a wide range of applications. When extreme violent mixing action is required, they are equipped with diffusion rings insuring adequate mixing action in the shortest possible time.

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Single Filling

Double Filling

and

ARMY Ducks

HOSE and BELTING

Ducks

Drills

Selected

Osnaburgs

Curran & Barry
320 BROADWAY
NEW YORK

COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	\$0.03	\$0.055
Rottenstone, domestic	ton	36.00	43.00

Accelerators, Organic

A-10	lb.	.40	.47
A-19	lb.	.52	.58
A-32	lb.	.59	.69
A-77	lb.	.42	.55
A-100	lb.	.42	.55
Accelerator 8	lb.	.83	
49	lb.	.44	.45
89	lb.	1.20	
122	lb.	1.30	
552	lb.	1.80	
808	lb.	.59	.61
833	lb.	1.13	1.15
Acrin	lb.	.75	
Advan	lb.	.55	
Aero AC 50	lb.	.50	.56
165	lb.	.37	.39
Almax	lb.	.35	.37
Arazeate	lb.	2.16	
Beutene	lb.	.59	.64
B-J-F	lb.	.27	.32
Butasan	lb.	1.00	
Butacate	lb.	1.00	
Butyl Eight	lb.	1.00	1.05
Zimate	lb.	1.00	
Captax	lb.	.27	.345
C-P-B	lb.	1.95	
Cumate	lb.	1.45	
Cuprax	lb.	.60	.62
Desterex N	lb.	.50	.57
DOTG (diorthotolyguanidine)	lb.	.44	.50
DPG (diphenylguanidine)	lb.	.39	.45
El-Sixty	lb.	.39	.46
Ethasane	lb.	1.00	
Ethamate	lb.	1.00	
Ethyl Thirurad	lb.	1.00	
Tuads	lb.	1.00	
Tuex	lb.	1.00	
Zimate	lb.	1.00	
Good-Rite Erie	lb.	.32	.34
Heptene	lb.	.42	.48
Base	lb.	1.80	1.90
Lodate	lb.	.00	
M-B-T	lb.	.27	.33
M-B-T-S	lb.	.35	.41
Mertax	lb.	.37	.44
Methesane	lb.	1.00	
Methacate	lb.	1.00	
Methyl Selenate	lb.	1.60	
Tuads	lb.	1.10	
Zimate	lb.	1.00	
Monex	lb.	1.10	
Monex Thirurad	lb.	1.10	
Monex 33	lb.	.53	.58
O-X-A-F	lb.	.54	.59
Pestex	lb.	.74	.84
Flour	lb.	1.225	1.225
phenex	lb.	.40	.45
Propate	lb.	.53	
R-Form products	lb.	1.00	3.00
Ratex	lb.	.39	.41
S.A. 52	lb.	.10	
37, 62, 67, 77	lb.	.00	
66	lb.	1.45	
Satex	lb.	1.15	
Santacure	lb.	.55	.62
Selasate	lb.	1.45	
Selerac	lb.	1.45	
SPDX-GH	lb.	.64	.69
Tellorac	lb.	1.45	
Tepadone	lb.	.55	
Tetrone	lb.	1.75	
A	lb.	1.85	
Thalam	lb.	.75	
Thionide	lb.	.35	.42
Thionex	lb.	1.10	
Thiotax	lb.	.27	.34
Thirurad	lb.	1.10	
Thirurad E	lb.	1.00	
M	lb.	1.10	
Trimene	lb.	.54	.64
Base	lb.	1.03	1.18
Tuex	lb.	1.10	
2-M.T.	lb.	.73	.55
Ultex	lb.	1.00	1.10
Ureka	lb.	.55	.62
Blend B	lb.	.55	.62
C	lb.	.52	.59
Vulcanex	lb.	.45	
Z-B-X	lb.	2.45	
Zenite	lb.	.33	.35
A	lb.	.42	.44
B	lb.	.39	.41
Special	lb.	.34	.36
Zetas	lb.	.33	.36

Accelerator-Activators, Inorganic

Lime, hydrated	ton	8.00	13.50
Litharge, comml.	lb.	1688	1775
Eagle, sublimed	lb.	1775	1785
Red lead, comml.	lb.	1788	1925
Eagle	lb.	1875	
White lead, basic	lb.	1713	.1813
Eagle	lb.	1713	.1813
White lead, silicate	lb.	.16	.2038
Eagle	lb.	1863	.2038
Zinc oxide, comml.	lb.	11	.1375

Accelerator-Activators, Organic

Barak	lb.	\$0.60	
Curade	lb.	.57	\$0.59
D-B-A-	lb.	1.95	
Delac P	lb.	.45	.52
Emersol 110	lb.	.15	.16
	120	.155	.165
	130	.1775	.1875
210 Elaine	lb.	.1025	.125
Emery 600	lb.	.0875	.11
Guantal	lb.	.47	.54
Hyfae 430	lb.	.155	.165
	431	.17	.18
Laurex	lb.	.28	.31
Lead oleate	lb.	.24	
MODX	lb.	.295	.345
NA-11	lb.	.65	
Palmalene	lb.	.35	
Plastone	lb.	.27	.30
Polyac	lb.	1.40	
Ridacto	lb.	.22	.24
Seedine	lb.	.1485	.1705
SOAC-KL	lb.	.08	.11
Stearex Beads	lb.	.1475	.1575
Stearic acid, single pressed	lb.	.14	.15
Double pressed	lb.	.145	.155
Triple pressed	lb.	.1675	.1775
Stearite	lb.	.09	.10
Tonox	lb.	.50	.59
Zinc stearate	lb.	.34	.36

Alkalies

Caustic soda, flake	100 lbs.	3.45	6.67
Liquid, 50%	100 lbs.	2.40	2.50
Solid	100 lbs.	3.05	6.27

Antioxidants

Age-Rite Alba	lb.	.220	.230
Gel	lb.	.58	.60
H.P.	lb.	.61	.63
Hipar	lb.	.82	.84
Powder	lb.	.46	.48
Resin	lb.	.63	.65
D	lb.	.46	.48
Stalite	lb.	.46	.48
White	lb.	1.40	.150
Akroflex C	lb.	.61	.63
Albasan	lb.	.69	.73
B-X-A	lb.	.46	.55
Antox	lb.	.23	.24
Araxox	lb.	.54	.56
Betanox Special	lb.	2.15	
B-L-E	lb.	.68	.77
Powder	lb.	.46	.55
B-X-A	lb.	.46	.52
Copper Inhibitor X-872-L	lb.	.95	1.05
Deener	lb.	.46	.53
Electol H	lb.	.61	.70
Flexatamine	lb.	.25	.26
Helozone	lb.	.66	.68
Neozone (standard)	lb.	.48	.50
Santoflex 35	lb.	.61	.68
Santovar-O	lb.	1.10	.117
Parasone	lb.	.75	
Perfectol	lb.	.61	.68
Permalux	lb.	1.65	
Rio Resin	lb.	.50	.52
Santoflex	lb.	.61	.68
S-C.R.	lb.	.32	.34
Solux	lb.	2.15	
Stabilite	lb.	.46	.48
Alba	lb.	.69	.74
L	lb.	.48	.50
Sunolite	lb.	.20	
Surproof	lb.	.25	.30
Improved	lb.	.23	.28
Jr.	lb.	.18	.23
Thermoflex A	lb.	.82	.84
Tonox	lb.	.50	.59
Tysonite	lb.	.215	.2225
V.G.B.	lb.	.55	.64
Zenite	lb.	.33	.35

Antiseptics

Copper naphthenate, 6-8%	lb.	.2225	
G-4	lb.	1.15	.270
G-11	lb.	3.50	
Pentachlorophenol	lb.	.20	.25
Resorcinol, technical	lb.	.75	
Soligen Drier-Copper 8%	lb.	.2325	
Zinc 8%	lb.	.22	
Zinc naphthenate, 8-10%	lb.	.2075	.255
Ammonium, bicarbonate	lb.	.055	.06
Carbonate	lb.	.185	.22
Sodium bicarbonate	100 lbs.	1.95	3.00
Carbonate, technical	100 lbs.	1.15	5.02
Unicel	lb.	.60	
ND	lb.	1.00	
S	lb.	.25	

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed; contact suppliers for spot prices.

†For trade names, see Color—White, Zinc Oxide.

Bonding Agents

MDI	lb.	\$7.00	\$7.75
50	lb.	3.50	4.00
Ty-Ply Q. S.	gal.	6.75	8.00

Brake Lining Saturants

B.R.T. No. 3	lb.	.024	.025
Resinex L-S	lb.	.0225	.03

Carbon Blacks

Conductive Channel—CC	lb.	.15	.22
Continental R-20, -40	lb.	.15	.185
Kosmos Dixie	lb.	.12	.165
Spheron C	lb.	.22	.25
N	lb.	.15	.185

Easy Processing Channel—EPC

Continental AA	lb.	.069	.1125
Kosmobil 77/Dixiedens	lb.	.07	.1125
77	lb.	.07	.1125

Hard Processing Channel—HPC

Continental F	lb.	.069	.1125
HX	lb.	.07	.1125
Kosmobil S. Dixiedens	lb.	.07	.1125
S-66	lb.	.07	.1125
Micronex W-6	lb.	.065	.1125
Spheron #4	lb.	.069	.117
Witco #4	lb.	.069	.1125

Medium Processing Channel—MPC

Arrow TX	lb.	.07	.1125
Continental A	lb.	.069	.1125
Kosmobil S-66/Dixiedens	lb.	.07	.1125

Conductive Furnace—CF

Statex A	lb.	.08	.10
Statex M	lb.	.0525	.095

Fast Extruding Furnace—FF

Statex B	lb.	.055	.0975
Sterling 99	lb.	.065	.105
105	lb.	.12	.16

Fine Furnace—FF

Statex B	lb.	.055	.0975
Sterling 99	lb.	.055	.09
Sterling L	lb.	.05	.09

High Abrasion Furnace—HAF

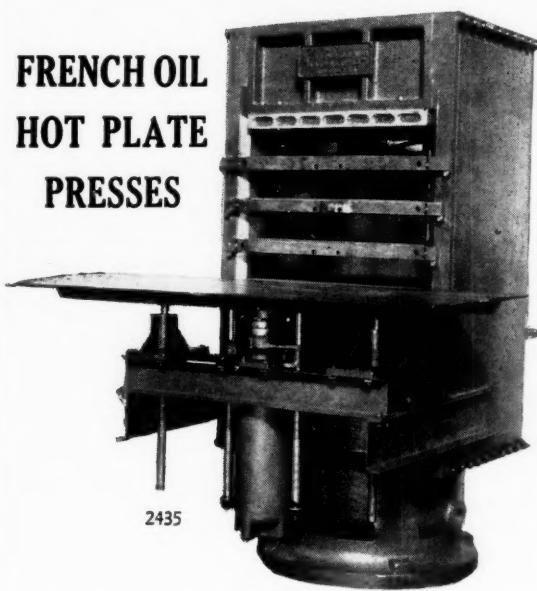
Philblack O	lb.	.07	.1145
Vulcan 1, #3	lb.	.074	.117

High Modulus Furnace—HMF

Contimex HMF	lb.	.05	.09

<

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HOT PLATE
PRESSES**



2435

Side plate or column presses for compression or transfer or injection molding of rubber and allied synthetics.

*Write for bulletins on
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C. M. BALDWIN	Chicago
ERNEST JACOBY & CO.	Boston
The C. P. HALL CO. of Calif.	Los Angeles
DELACOUR-GORRIE LIMITED	Toronto

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does not mean cotton fiber alone

EXPERIENCE

over twenty years catering to rubber manufacturers

CAPACITY

for large production and quick delivery

CONFIDENCE

of the entire rubber industry

KNOWLEDGE

of the industry's needs

QUALITY

acknowledged superior by all users are important and valuable considerations to the consumer.

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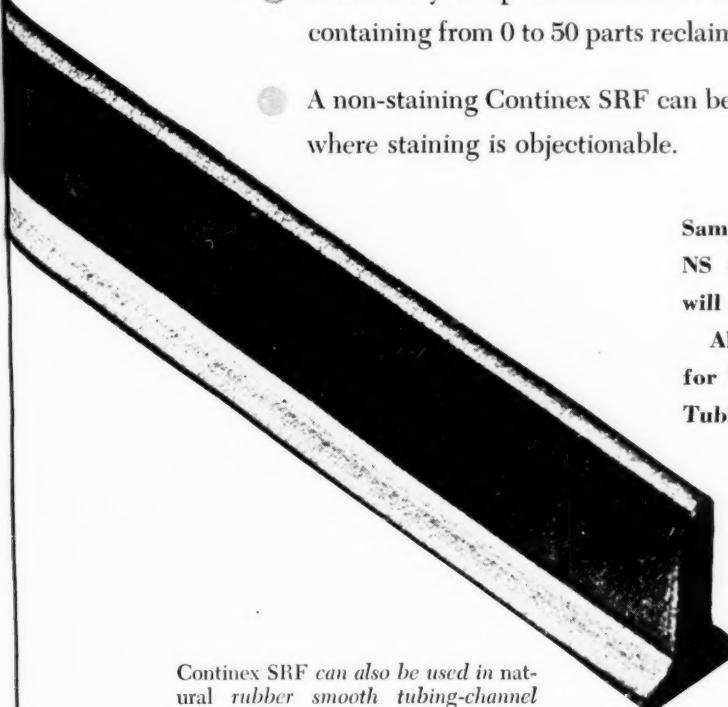
Sales Representatives:

Charles Larkin II, 250 Delaware Avenue, Buffalo 2, N. Y.
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Ernesto Del Valle, Tulsa 64, Mexico D.F.

points of interest

ABOUT "COLD RUBBER" AND CONTINEX SRF

- Approximately 35% higher loadings of Continex SRF, as used for the smooth tubing shown in the illustration, can be achieved more economically and with no sacrifice in processing safety and speed.
- Continex SRF in "Cold Rubber" enables the production of smooth tubing-channel compounds having minimum radial swell heretofore impossible with GR-S.
- Satisfactory compounds similar to the illustration can be produced containing from 0 to 50 parts reclaim per 100 parts "Cold Rubber."
- A non-staining Continex SRF can be supplied for specialty items where staining is objectionable.



Continex SRF can also be used in natural rubber smooth tubing-channel compounds with up to 35% higher loadings than are possible with a smooth-out type HMF black. Technical Service Report CB-2 gives details. Write for your copy today!

Samples of Continex SRF and Continex SRF-NS (Non-staining), as well as formulations, will be supplied on request.

Also, for more complete information, write for Technical Service Report CB-3 "Smooth Tubing Cold Rubber Channel Compounds."



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Flexol Plasticizer 3GH	lb.	\$0.42	\$0.44	B. R. T. No. 4	lb.	\$0.0225	\$0.0235	Carbon bisulfide	lb.	\$0.0445	\$0.095
3GO	lb.	.515	.535	B. R. V.	lb.	.0325	.049	Tetrachloride	lb.	.08	.115
4GO	lb.	.36	.38	BWH-1	lb.	.14		Cosol.	gal.	.30	.38
8N8	lb.	.375	.395	Dipolymer Oil	gal.	.33	.38	GVL	lb.	1.00	
DOP	lb.	.43	.455	Dispersing Oil No. 10	lb.	.0525	.055	Nevsol	gal.	.185	.25
R-I	lb.	.47	.475	G. B. Reclaiming Oil	gal.	.12	.18	Picco Hi-Soly Solvents	gal.	.21	.26
TOF	lb.	.47	.49	Heavy Resin Oil	lb.	.0225	.0375	Skellysolve-E	gal.	.153	
TWS	lb.	.405	.425	lx-77	gal.	.18	.30	-H	gal.	.133	
Galex W-100	lb.	.135	.1725	.572	gal.	.23	.34	-R-V	gal.	.109	
W-100D	lb.	.1325	.17	No. 1621	lb.	.025	.035	-S	gal.	.099	
G. B. Light Process Oil	lb.	.025	.0325	3186	gal.	.28	.295	Tollac, industrial	gal.	.195	.25
Naphthenic Neutrals	gal.	.11	.18	Picco C-10	gal.	.25	.30	Toluol, industrial	gal.	.19	.25
Heavy Resin Oil	lb.	.0225	.0375	C-28	gal.	.33	.38	2-50 W Hi-Flash Solvent	gal.	.37	
Hercolyn	lb.	.1112	.1347	C-33	gal.	.20	.25	Xylool, industrial	gal.	.23	.28
Hyfac 430	lb.	.165	.175	C-42	gal.	.27	.32				
431	lb.	.18	.19	D-4	gal.	.23	.28				
Indonex	gal.	.12	.17	E-5	gal.	.21	.26				
JMH	lb.	.65	.68	Q-Oil	gal.	.246	.296				
Monoplex DBS	lb.	.56	.57	PT 101 Pine Tar Oil	gal.	.32	.43				
DOA	lb.	.435	.445	150 Pine Solvent	gal.	.44	.55				
DOS	lb.	.58	.59	Solenol	gal.	.56	.58				
5	lb.	.70	.71	S. R. O.	lb.	.015	.0225				
Nevillac oils	lb.	.33		Wilcox Nos. 111, 151	gal.	.26	.30				
Resins	lb.	.31	.45	X-1 Resinous Oil	lb.	.0175	.0325				
Neville LX-685	lb.	.12		-60 Solvent	gal.	.24	.38				
R Resins	lb.	.105	.155								
Nevinol	lb.	.17									
Nevell	lb.	.0325	.0425								
No. 1-D heavy oil	lb.	.055									
Palmalene	lb.	.15									
Para Flux, regular	gal.	.10	.2025								
No. 2016	gal.	.165	.24	Bunarex resins	lb.	.06	.125				
Heavy	gal.	.155		Calcene T	ton	.4500	.5500				
Para Resins	lb.	.04	.045	Calco S. A.	lb.	.75					
Paradene Resins	lb.	.065	.075	Carbone	lb.	.0325	.0375				
Para Lube	lb.	.046	.048	644	lb.	.0375	.0425				
Paraplex AL-111	lb.	.33	.3375	645	lb.	.036	.0385				
G-25	lb.	.76	.77	S.	lb.	.0475	.0525				
-40	lb.	.43	.44	S Plastic	lb.	.046	.051				
-50	lb.	.395	.405	Clays							
Peptizene #2	lb.	.90		Aluminum Flake	ton	16.00	.22.00				
Pepton 22	lb.	.72	.75	No. 5	ton	20.00					
Picco-10, -25	lb.	.12	.17	Buca	ton	40.00					
-75, -100	lb.	.115	.17	Burgess Iceberg	ton	50.00					
480 Oilproof resin	lb.	.13		Pigment No. 20	ton	35.00					
S. O. S.	gal.	.29	.34	No. 30	ton	37.00					
Piccoester 30	lb.	.055	.06	Polyclay	ton	45.00					
Piccolastic Resins	lb.	.139	.275	Catalpo	ton	30.00					
Piccolite Resins	lb.	.15	.2075	Dixie	ton	14.00					
Piccomaroon Resin 427-R	lb.	.12	.17	Hydratex R	ton	30.00					
Resins	lb.	.06	.17	L. G. B.	ton	17.00					
Piccovars	lb.	.12	.125	Paragon (R)	ton	13.50	.31.50				
Piccovol	lb.	.025	.04	Pigment No. 33	ton	30.00					
Pictac	gal.	.25	.30	Suprex	ton	14.00	.32.00				
Pigmentar	gal.	.035	.045	Witco No. 1	ton	14.00	.30.00				
Pigmentaroil	gal.	.035	.045	No. 2	ton	13.50	.30.00				
Pine Oil, American	gal.	.45	.55	Clearcarb	lb.	.1175	.1225				
Sunny South	gal.	.45	.55	Cumar EX	lb.	.0525					
Plastender S	lb.	.0375	.04	MH	lb.	.065	.1175				
Plasticizer 35	lb.	.205	.24	V	lb.	.0975	.1275				
36	lb.	.305	.34	Darex Copolymer Nos. 3							
42	lb.	.34	.40	X-34	lb.	.35	.37				
2175	lb.	.46	.56	No. X 43	lb.	.36	.38				
3425	lb.	.605		G Resin	lb.	.08					
3497	lb.	.61		Good-Rite Resin 50	lb.	.415	.455				
3560	lb.	.56		Magnesia, Calcined							
B	lb.	.35	.45	Extra Light U. S. P.	lb.	.34					
SC	lb.	.50	.57	K&M	lb.	.31					
Plastoflex #3, SC	lb.	.50		Light, technical	lb.	.28					
+50	lb.	.38		No. 101	lb.	.175					
FP-6	lb.	.52		Heavy, technical	lb.	.05	.1275				
Plastogen	lb.	.0775	.08	Medium light, technical	lb.	.12					
Plastolein	lb.	.32	.53	Magnesium carbonate	lb.	.09	.125				
Plastone	lb.	.22	.30	Marbon S. S-1	lb.	.36	.43				
PS-60 Resin	lb.	.35		Millicel	ton	27.50					
PT67 Light Pine Oil	gal.	.60	.70	Multiflex MM	ton	105.00					
101 Pine Tar Oil	gal.	.32	.43	Special	ton	125.00					
400 Light Pine Tar	gal.	.345	.455	Neville R Resins	lb.	.10	.155				
600 Med. Pine Tar	gal.	.345	.455	Para Resins 2457, 2718	lb.	.04	.045				
800 Heavy Pine Tar	gal.	.345	.455	Picco-75, -100	lb.	.115	.17				
R-19, R-21 Resins	lb.	.1075		Piccolastic Resins	lb.	.139	.275				
Resogen	lb.	.1175		Piccolite Resins	lb.	.15	.2075				
Resin C pitch	lb.	.02	.0285	Piccomaroon Resins	lb.	.06	.17				
R-6.3	lb.	.38	.40	Piccovars	lb.	.12	.125				
Resinex	lb.	.0325	.0375	Philotite, Natural Rubber	lb.	.75	.82				
L-4	lb.	.0225	.03	Milled	lb.	.85	.92				
RPA No. 2	lb.	.65		S-2, Milled	lb.	.74	.81				
No. 3	lb.	.46		S-3,6	lb.	.36	.43				
RSN Flux	gal.	.57	.19	S-6 Masterbatches	lb.	.35	.50				
Rubberol	lb.	.215		PS-60 Resin	lb.	.35					
S-Polymers	lb.	.44		Resin C Pitch	lb.	.02	.0285				
Sartacol B-16	lb.	.52		Resinex	lb.	.0325	.0375				
E-15	lb.	.49	.54	Rubber Resin LM-4	lb.	.28	.35				
M-17	lb.	.46	.51	S-Polymers	lb.	.44					
No. 140	lb.	.3225	.38	Silene EF	lb.	.055	.06				
Seedine	lb.	.1485	.1705	Super Multifex	ton	124.00					
Softener #20	gal.	.10	.20	Witcarb R	ton	105.00	.120.00				
Solvenol	gal.	.56	.58	R-12	ton	45.00	.65.00				
Stearolex Beads	lb.	.06	.065	Zinc oxide, commercial†	lb.	.11	.1375				
Stearic acid, single pressed	lb.	.14	.15								
Double pressed	lb.	.145	.155	Cumar RH	lb.	.105					
Triple pressed	lb.	.1675	.1775	Delac J	lb.	.55	.60				
Steartite	lb.	.09	.10	E-S-E-X	lb.	.36	.41				
Syn-Tac	gal.	.33	.35	Good-Rite Vultrol	lb.	.55	.57				
Synthol	lb.	.205		R-17 Resin	lb.	.1075					
TR-11	lb.	.035		Retarder ASA	lb.	.45					
Turgum S	lb.	.0875	.0975	PD	lb.	.36					
Tynostac	lb.	.215	.2225	W	lb.	.43					
Vistac No. 1	gal.	.121	.132	Retardex	lb.	.51	.54				
4	gal.	.162	.166	R.M.	lb.	.125					
X-1 Resinous Oil	lb.	.176	.180	Thionex	lb.	.125					
XX-100 Resin	lb.	.0175	.0325	Vultrol	lb.	.30	.55				
XX-100 Resin	lb.	.0525									
Reclaiming Oils				Solvents							
Bardol 639	lb.	.0275	.045	Benzol, industrial	gal.	.20	.21				
3, P, H, N	lb.	.02	.029	Bundesol	lb.	.55	.60				

Reclaiming Oils

Bardol. 639. .0275 .045 Benzol, industrial, gal. .20 .21 White lead silicate. lb. .16 / 2038
 3. P. H. N. .02 .029 Bendoem. lb. .55 .60 Eagle. lb. 1863 / 2038



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United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

May, 1949				May, 1949					
	Quantity	Value		Quantity	Value		Quantity	Value	
Imports for Consumption of Crude and Manufactured Rubber									
UNMANUFACTURED, Lbs.									
Crude rubber	114,784,309	\$18,827,018		Tire repair materials:					
Rubber latex	4,907,326	1,105,887		Camelback	192,715	\$55,413	UNMANUFACTURED, Lbs.		
Balata	231,594	60,361		Other	160,276	80,009	Crude rubber	874,664	\$181,457
Jelutong or Pontianak	189,318	83,291		Rubber and friction tape:			Balata	4,583	1,183
Chicle	573,595	355,259		except medical	34,299	26,230	Jelutong, gutta percha, and similar gums	2,000	3,520
Synthetic rubber	3,140,040	591,413		Conveyer and	104,528	124,156	TOTALS	881,247	\$186,160
Scrap rubber	1,178,188	24,900		Levigator	90,454	143,326	MANUFACTURED		
				Flat belts	74,758	73,323	Rubber toys and balls		
TOTALS	125,005,370	\$21,048,159		Other	39,204	41,600	Tire casings: truck and bus		
MANUFACTURED							Inner tubes, except auto, truck, bus	8	332
Tires: auto, bus, truck	130	\$1,243					Rubber and friction tape, except medical	423	295
Bicycle	no.	4,311					Packing	563	289
Inner tubes: auto, etc.	212	418					Latex and other compounded rubber for further manufacture	660	137
Rubber footwear: shoes, overshoes	128	373					Other natural and synthetic rubber manufactures		275
Rubber-soled canvas shoes	5184	2,341					TOTALS		\$5,386
Athletic balls: golf	28,704	11,163					GRAND TOTALS		\$191,546
Tennis	1,800	290					ALL RUBBER REEXPORTS		
Other	514,056	87,256					SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.		
Rubber toys, except balloons									
Hard rubber goods									
Rubber and cotton packing									
Gaskets, valve packing									
Beltling	700	1,020							
Hose and tubing	4,924	6,910							
Drug sundries									
Rubber instruments	17	72							
Golf ball centers	120	238							
Heels and soles	1,875	355							
Synthetic rubber goods		1,692							
Other soft rubber goods		34,384							
TOTALS		\$176,311							
GRAND TOTALS, ALL RUBBER IMPORTS		\$21,224,470							
Exports of Domestic Merchandise									
UNMANUFACTURED, Lbs.									
Chicle and chewing gum bases	267,760	\$129,774							
Balata	564	1,776							
Synthetic rubbers: GR-S	376,094	84,554							
Butyl	44,001	7,810							
Neoprene	542,190	188,007							
Nitrile	423,914	202,347							
"Thickol"	1,500	1,939							
Polyisobutylene	1,300	420							
Other	3,960	4,484							
Reclaimed rubber	1,986,888	163,531							
Scrap rubber	3,096,279	96,352							
TOTALS	6,714,450	\$880,994							
MANUFACTURED									
Rubber cement	94,371	\$198,642							
Rubberized fabric: auto cloth	2,058	3,066							
Piece goods and hospital sheeting	96,620	74,866							
Rubber footwear:									
Boots	4,250	20,655							
Shoes	6,827	7,651							
Rubber-soled canvas shoes	26,806	58,051							
Soles	11,239	40,156							
Heels	35,777	26,184							
Rubber soles and top-lift sheets	61,937	16,348							
Gloves and mittens	12,229	41,063							
Drug sundries: hot water bottles and fountain syringes	17,744	12,419							
Other		199,735							
Rubber and rubberized clothing									
Balloons		208,174							
Rubber toys and balls		61,892							
Erasers		16,410							
Hard rubber goods: battery boxes	21,662	14,701							
Other electrical goods		29,214	40,077						
Combs, finished	112,772	57,367							
Other	5,577	8,272							
Tire casings: truck and bus		10,531							
Auto	79,640	3,594,813							
Aircraft	42,142	589,640							
Farm tractors, etc.	2,103	98,109							
Other off-the-road	18,310	589,890							
Bicycle	9,536	12,610							
Motorcycle	448	2,773							
Other	2,263	43,318							
Inner tubes: auto, truck, bus		80,986	312,271						
Other		29,214	79,239						
Solid tires: truck and industrial		3,170	120,947						
Other		12,825	2,414						

United States Rubber Statistics — May, 1949

(All Figures in Long Tons, Dry Weight)								
	New Supply	Distribution		Production	Imports	Total	Consumption	Exports
Natural rubber, total	0	51,319	43,371	0	51,319	43,371	390	103,487
Latex, total	0	2,191	2,191	0	2,191	2,191	0	8,388
Rubber and latex, total	0	33,510	33,510	43,128	33,510	43,128	390	111,875
Synthetic rubber, total	28,737	1,402	33,737	33,737	33,737	619	112,737	
GR-S	24,139	1,342	25,924	25,924	25,924	168	24,114	
	1443							
Neoprene	21,190	0	2,190	2,190	2,190	242	4,234	
Butyl	4,598	60	4,658	4,799	4,799	20	12,404	
Nitrile	3965	0	965	492	492	189	3,005	
Natural rubber and latex, and synthetic rubber, total	32,335	54,912	87,247	87,247	87,247	81,395	1,009	224,632
Reclaimed rubber, total	18,181	0	18,181	18,181	18,181	18,323	887	32,326
GRAND TOTALS	50,519	54,912	105,431	99,718	99,718	1,896	256,958	

*Government plant production.

†Private plant production.

‡Includes 18 tons shipped for export, but not cleared.

SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory — June, May, 1949; First Half, 1949, 1948

	June	Change from Preceding Month	May	First Six Months	First Six Months
Shipments					
Original equipment	2,927,512		2,103,465	13,337,973	10,165,739
Replacement	3,635,459		3,764,234	17,683,030	20,217,985
Export	35,547		40,967	239,226	341,662
TOTAL	6,598,518	+11.68	5,998,666	31,257,229	30,725,386
Production	6,470,724	+ 8.19	5,980,837	33,306,967	34,613,365
Inventory end of month	10,618,442	- 1.40	10,769,289	10,618,442	9,331,738
Total Automobile Casings					
Shipments					
Original equipment	3,234,174		2,380,087	15,380,165	12,987,658
Replacement	4,185,301		4,322,505	20,898,564	23,892,226
Export	115,664		121,111	744,515	938,992
TOTAL	7,535,239	+10.43	6,823,703	37,023,244	37,818,876
Production	7,391,807	+ 6.60	6,934,326	39,649,779	42,260,254
Inventory end of month	13,133,816	- 1.26	13,301,203	13,133,816	11,435,992
Passenger and Truck and Bus Tires					
Shipments					
Original equipment	3,230,789		2,379,948	15,356,949	13,002,116
Replacement	3,106,247		2,829,647	15,746,231	19,070,762
Export	72,179		85,468	504,000	557,756
TOTAL	6,409,215	+21.02	5,295,033	31,607,180	32,630,934
Production	6,430,026	+ 5.62	6,085,164	34,505,903	34,700,758
Inventory end of month	12,465,760	+ 0.45	12,410,463	12,465,760	9,996,572

NOTE: Cumulative data on this report include adjustments made in prior months.

SOURCE: The Rubber Manufacturers' Association, Inc., New York, N. Y.



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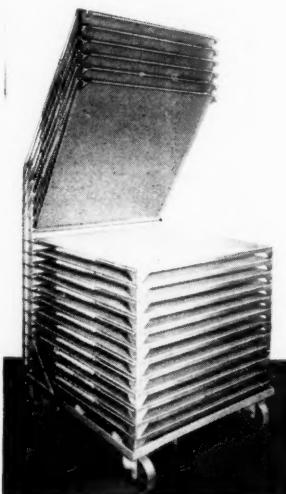
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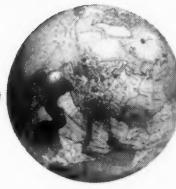
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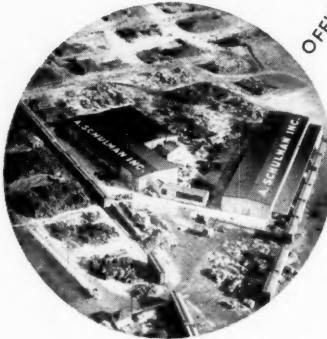
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